Machine and Tool BLUE BOOK

ESTABLISHED 1906

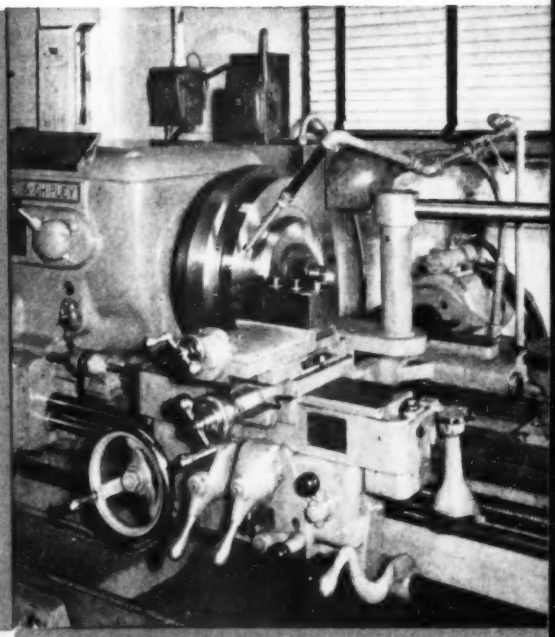
SEPTEMBER 1954

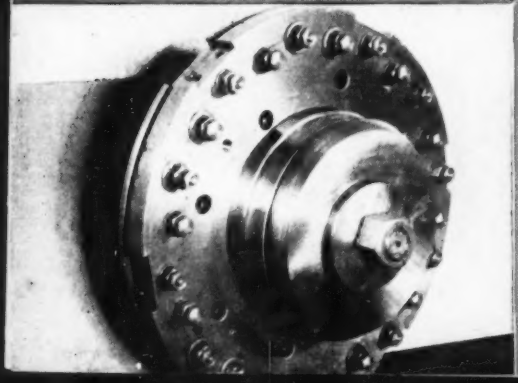
New Fluteless Drill is 66% Cheaper

Time Study: Selecting the Operator to be Timed

Shop-Built Special Tools Save 300% Labor-Materials

TURNING TITANIUM JET COMPRESSION DISCS





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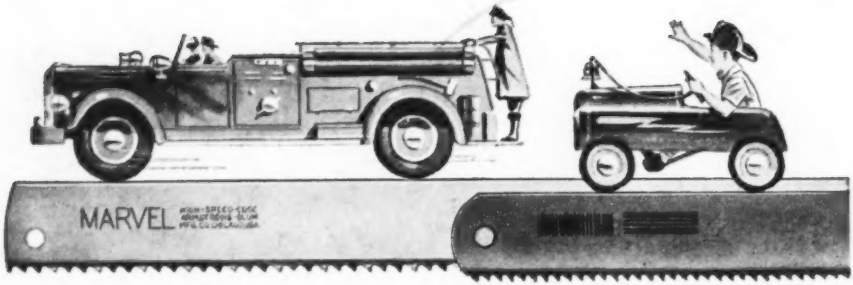


. . . *but*

Experience Cannot be Copied

More than a quarter-century ago MARVEL invented and basically patented the MARVEL High-Speed-Edge Hack Saw Blade—the UNBREAKABLE blade that increased hack sawing efficiency many-fold.

Every MARVEL Hack Saw Blade ever sold has been of that basic welded high-speed-edge construction, with constant improvements from year to year, as EXPERIENCE augmented the "know-how" . . .

MARVEL is not "tied" to any single source of steel supply, and has always used the best high speed steels that became available from time to time as metallurgy progressed. When-as-and-if finer steels are developed—and are proven commercially practical for welded-edge hack saw blades—MARVEL will use them, regardless of cost or source . . .

There is only one genuine MARVEL High-Speed-Edge! All other "composite" or "welded-edge" hack saw blades are merely flattering attempts to imitate—without the "know-how" of MARVEL EXPERIENCE . . .

Insist upon *genuine* MARVEL High-Speed-Edge when buying hack saw blades—and be SAFE, for you can depend upon MARVEL. They have been "tested", "pre-tested", and "re-tested" by thousands of users for more than a quarter-century!

MARVEL *Metal Cutting* **SAWS**

Better Machines—Better Blades

ARMSTRONG-BLUM MFG. CO. • 5700 Bloomingdale Ave. • Chicago 39, U. S. A.

If you want a jig borer...

better see the *plus* features in the KNIGHT No. 50

★

SPECIFICATIONS

- Spindle speeds, 16—40 to 2000 RPM
- Boring feeds, —infinitely variable .0000"—.010"
- Vertical capacity—28"
- Table travel—longitudinal 28", cross 18"
- Table feeds—dial type, 16
- Table feeds—per minute, 5 .16" to 20"
- Table rapid traverse—both directions, 100"
- Horsepower—7½
- Weight—8100 lbs.

The BIG ADVANTAGE of the Knight No. 50 lies not only in its ability to do precision boring and drilling, but in its versatility for performing a wide range of other difficult milling and machining operations without transferring the workpiece from one machine to another. Much of the layout work and preliminary drilling are eliminated, and the whole job is finished quicker on the No. 50.

In addition to making work transfers unnecessary, setup time is reduced by half or more—output is greatly increased—and fewer high-priced manhours are required on each job.

Exclusive on the No. 50 is the dial-controlled infinitely variable spindle feeds. Extra-long travel of the precision roller bearing-mounted one-piece spindle gives this versatile machine another plus feature. Extra-rugged and careful construction promise exceptional accuracy. Convenient quick-action controls and full-vision work areas make operation simple and easy.

KNIGHT VERSATILE MILLING ACCURATE RIGID

W. B. KNIGHT MACHINERY COMPANY
3924 W. Pine Blvd. · St. Louis 8, Mo.

ATTACH TO COMPANY LETTERHEAD

Send catalog on No. 50 and other Knight boring and milling machines.

Name .....

Title .....

☐ Send data on Knight's 20" & 42" Rotary Tables.

Send Coupon For Catalog

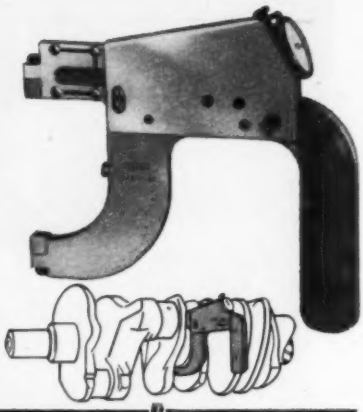
TWO NEW GAGES

TRY 'EM FOR *SIZE* ON TOUGH MEASURING JOBS!

INDICATING CRANKSHAFT GAGE MODEL 1340 P-40

BUILT ESPECIALLY FOR CRANKSHAFT JOBS and similar work, this thin gage gets in between shoulders or close beside bearings and its flat anvils of Tungsten Carbide permit accurate measurements of such critical dimensions. Measurements are transferred from the sensitive anvil to the CONVENIENTLY PLACED INDICATOR through the integrated pantograph unit. Free of all friction, inertia and side play, this unit also counteracts the weight of the gage and operator's hand.

No matter what the position of the throws, Model 1340 P-40 easily measures bearing diameters in the narrow spaces between shoulders of a crankshaft.



PITCH DIAMETER AND SPIRAL GEAR GAGE 202 SERIES

FOR USE IN STATISTICAL QUALITY CONTROL right at the machine as well as final inspection, these gages check pitch diameter of spur gears, helical gears, splines, and chain sprockets. Both upper and lower contacts are of Tungsten Carbide. The upper contact is adjustable for 1" on all five regular sizes and swivels so it seats properly in relation to the lower anvil before being locked in position. The adjustable rear guide positions the gage on the gear, assuring gaging the proper spaces between gear teeth which may be either even or odd in number.

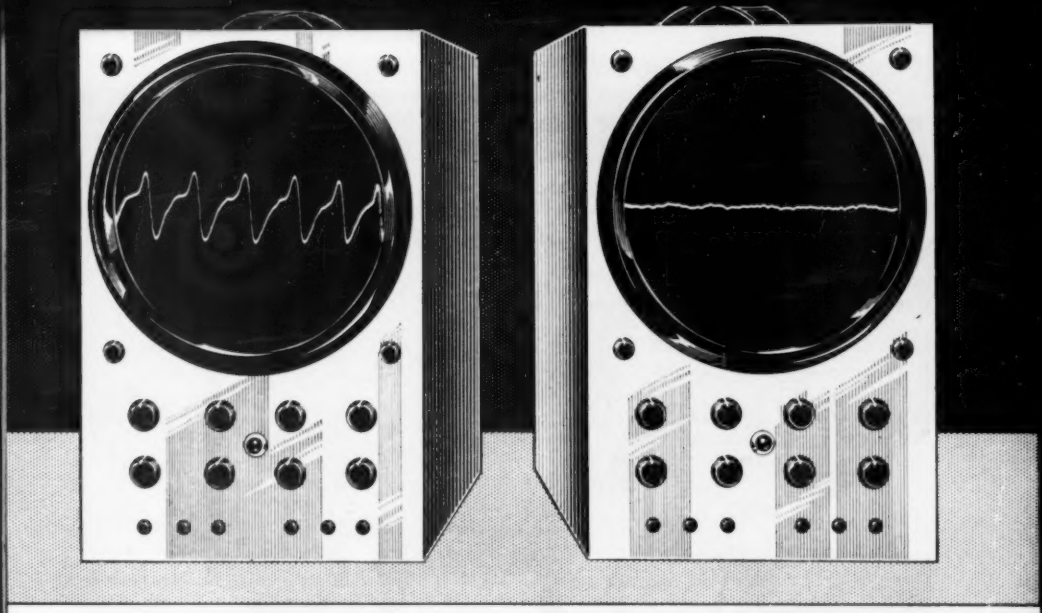
For complete information on these new tools, write today to Federal Products Corporation, 4259 Eddy Street, Providence 1, Rhode Island.

Gear centered properly by rear guide and cylindrical contacts.

Ask **FEDERAL**

FOR ANYTHING IN MODERN GAGES...

Dial Indicating, Air, Electric, or Electronic — for Inspecting, Measuring, Sorting, or Automatically Controlling Dimensions on Machines



WHEN A STRAIGHT MINERAL OIL was used to lubricate the ways, an 0.0008" jump at frequency of 2.74 cycles per second was noted.

WHEN SUNOCO WAY LUBRICANT was used on the ways, the jump was too small to measure, proof that this medium stops slip-stick motion.

TEST PROVES SUNOCO WAY LUBRICANT ENDS SLIP-STICK TABLE MOTION

How effectively Sunoco Way Lubricant stops slip-stick table motion is graphically illustrated by these oscillograms. The pattern on the left was made with a straight mineral oil as the lubricant; the other was made with Sunoco Way Lubricant on the ways. The patterns on the oscilloscopes are magnifications of changes in rate of table travel and were obtained under identical operating conditions.

You can stop slip-stick table motion, protect the ways, get better surface finishes, cut production losses with Sunoco Way Lubricant. Try it in your shop. For more information, call your nearest Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. MT-9.

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

SUNOCO®

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Refiners of the famous Blue Sunoco Gasoline and Dynalube Motor Oils

ARMSTRONG

Quality

TOOLS

Not a cost, but an investment that pays year after year

Buy ARMSTRONG TOOL HOLDERS and TOOLS for today's job and they will bring you added profits thru the years. With ARMSTRONG TOOL HOLDERS you will be permanently tooled up for whatever comes, for each is a multi-purpose tool that takes cutter-bits ground to many shapes. Each is an efficient tool, refined thru a half century of world wide use. Each has strength beyond any need, extra strength resulting from endless research and the most modern closely controlled manufacturing methods.

ARMSTRONG TOOL HOLDERS are inexpensive too, for they are produced in great numbers. They are instantly available because they are carried in stock by all leading supply houses in sizes and types for every operation on lathes, planers, slotters and shapers; for standard operations on turret lathes and screw machines. They are profitable in use because they permit the highest speeds and heaviest feeds and "Save: All Forging, 70% Grinding and 90% High Speed Steel."

ARMSTRONG Lathe and Milling Machine Dogs are permanent tools, too. They are drop-forged from special open hearth steels, are heat treated to extreme stiffness and toughness. They have alloy steel screws hardened at the tip to prevent up-setting and have double life, for hubs are made oversize to permit re-tapping.

ARMSTRONG Quality pays over and over again. Write for new 8-48 catalog. It offers many opportunities to conserve profits.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

5208 W. ARMSTRONG AVENUE • CHICAGO 30, ILL.

Machine and Tool BLUE BOOK

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Hitchcock Managers are Listed on Page 64

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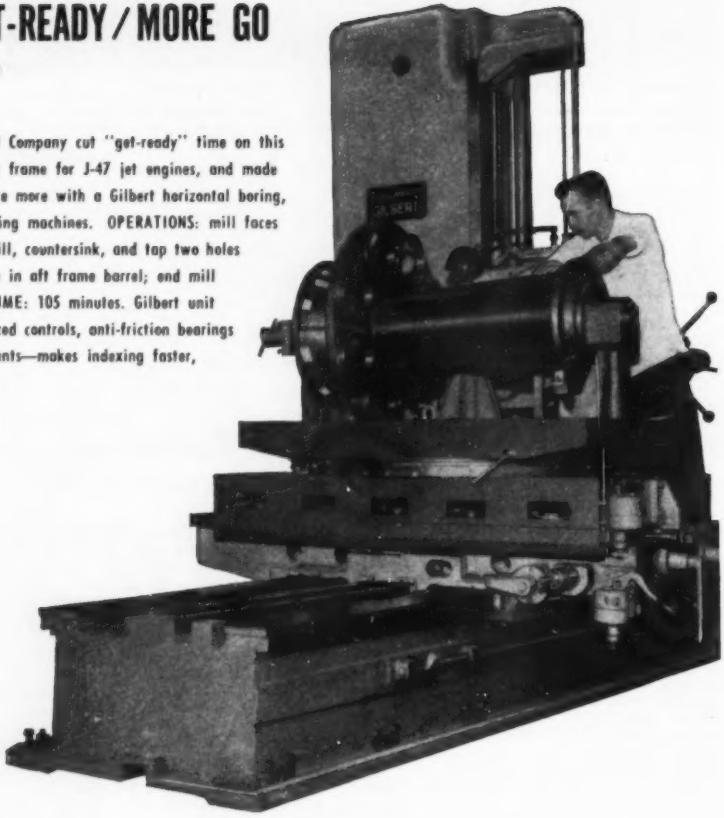
BPA

LESS GET-READY / MORE GO

Ryan Aeronautical Company cut "get-ready" time on this stainless steel aft frame for J-47 jet engines, and made "go" time produce more with a Gilbert horizontal boring, drilling, and milling machines. OPERATIONS: mill faces of lifting pad; drill, countersink, and tap two holes in pad; drill hole in aft frame barrel; end mill three scallops. TIME: 105 minutes. Gilbert unit head has centralized controls, anti-friction bearings on hand adjustments—makes indexing faster, operation easier.



"Those who buy Gilbert buy Gilbert again" because of the efficiency of the single spindle and unit head design, ample capacity for most boring requirements, plenty of power for fast and heavy cuts with carbide tools, sustained accuracy in long, hard service. 3½-inch spindle, table and floor type boring mills available in a wide variety of arrangements. Write for Bulletin 953.

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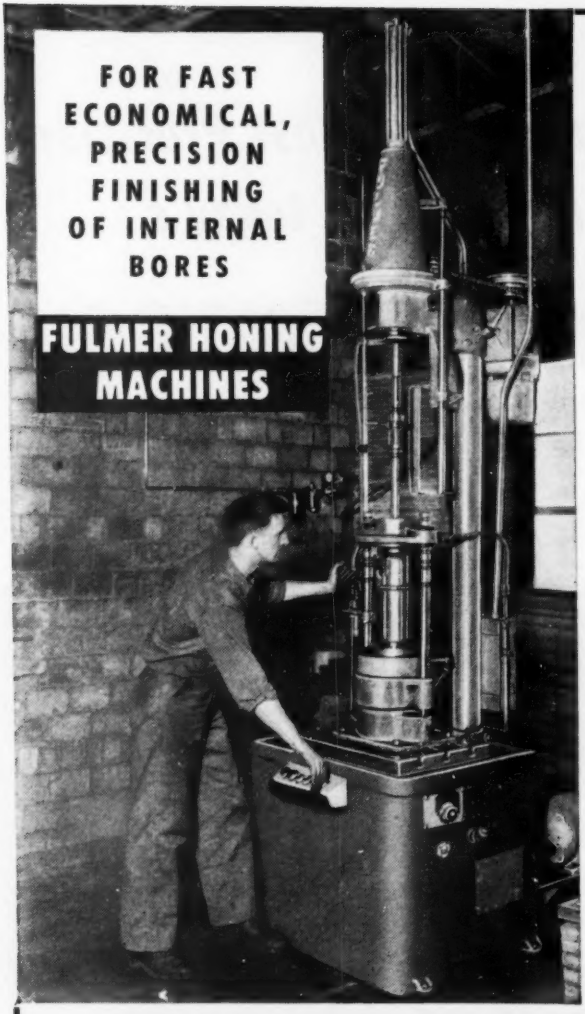
THE CINCINNATI GILBERT MACHINE TOOL COMPANY • 3366 BEEKMAN STREET, CINCINNATI 23, OHIO



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- **honing machines**
  15 sizes: diameters from ¼" to 40" with strokes from 12" to 144"
- **honing tools**
  sizes to 50"
- **honing fixtures**
  for your special purposes
- **aircraft rod borers**
- **piston ring lapping**
- **centrifugal casting machines**

WRITE TODAY for your copy of bulletin on honing

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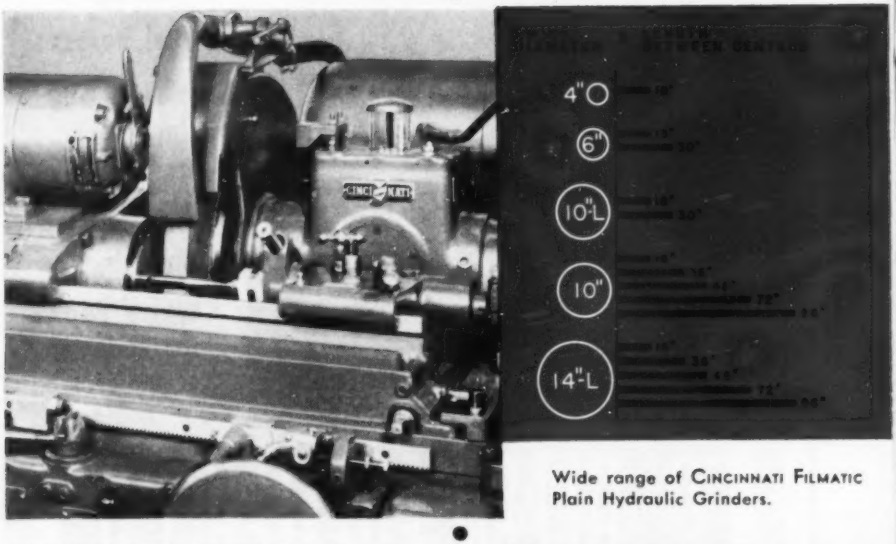
Producing Low Cost Precision is a job for today's

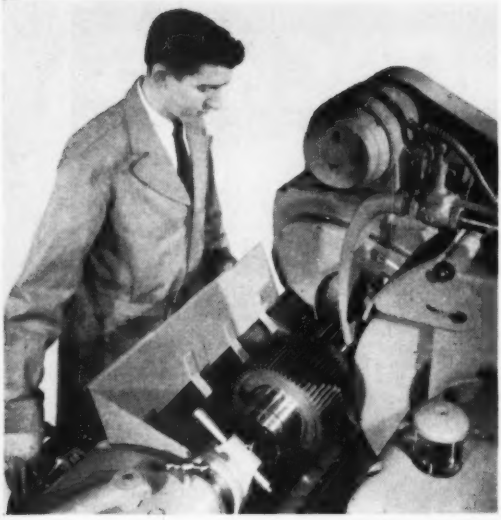
CINCINNATI FILMATIC PLAIN HYDRAULIC GRINDERS



Wide range of CINCINNATI FILMATIC Plain Hydraulic Grinders.

Infeed grinding the bearing diameter of a cotton picker spindle, CINCINNATI FILMATIC 6" Plain Hydraulic Grinder.

CINCIN



Grinding the sleeve diameter of a gear assembly. CINCINNATI FILMATIC 10" Plain Hydraulic Grinder.

FILMATIC

CINCINNATI FILMATIC

Plain Hydraulic Grinders

According to a recent survey, you could replace many of your old centertype grinders now with new machines, and immediately gain two big advantages:

1) Higher production at a lower cost
2) Closer accuracy

Here's the way in which CINCINNATI FILMATIC Plain Hydraulics, the 10" size for example, help you attain these desirable results: FILMATIC grinding wheel spindle bearings are an outstanding factor in producing low-cost precision, they never require adjustment or maintenance; two-speed manual table traverse aids the operator in quickly setting up the machine; the table traverse stroke consistently reverses within an accuracy of .004", making it safe to traverse grind close to shoulders. Infeed jobs can be handled with a minimum of operator attention through the Automatic Infeed Equipment. More information about these producers of low-cost precision will be found in Sweet's Machine Tool Catalog, and complete data may be obtained by writing for catalog No. G-603.

CINCINNATI GRINDERS INCORPORATED
Subsidiary of The Cincinnati Milling Machine Co.
CINCINNATI 9, OHIO

CINCINNATI

NATI CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES

ACME BROACHES

ALL TYPES, SIZES AND SHAPES FOR ECONOMICAL PRODUCTION

● Yes, in addition to all types of Broaching Machines, Broach Fixtures and Pullers, Acme Broach Corporation also manufactures all types, sizes and shapes of Broaching Tools of highest quality. Shown above are Broach Holders and Inserts for Breech Ring opening in 90 MM Cannon. Remember, Acme—the complete line.

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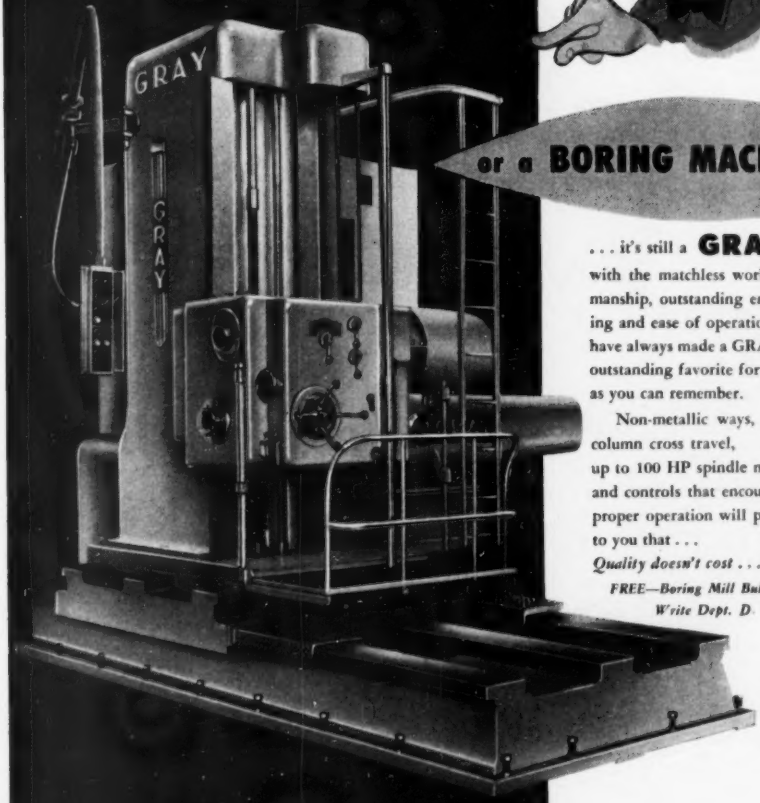
MILAN, MICHIGAN

whether it's a . . . PLANER



or a BORING MACHINE

. . . it's still a **GRAY** with the matchless workmanship, outstanding engineering and ease of operation that have always made a GRAY the outstanding favorite for as long as you can remember.

Non-metallic ways, column cross travel, up to 100 HP spindle motor, and controls that encourage proper operation will prove to you that . . .

Quality doesn't cost . . . it pays.

FREE—Boring Mill Bulletin. Write Dept. D

The G.A. GRAY Company

planers • milling planers
planer type milling machines
horizontal boring machines

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4 Grinding Operations

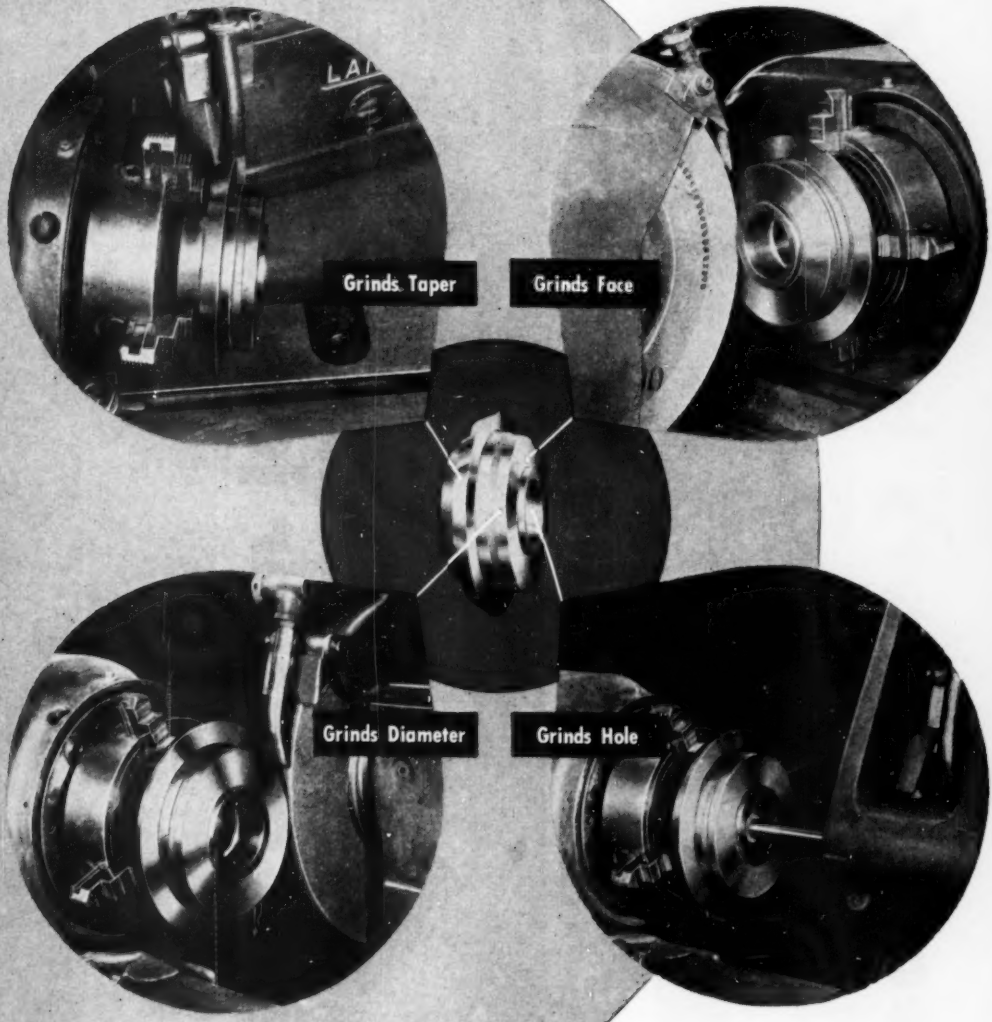
Versatility . . . an investment-saving advantage of Landis Universal Cylindrical Grinders

12" x 36" Landis Universal with swinging internal fixture and hydraulic rapid wheel head positioning.

LANDIS

precision grinders

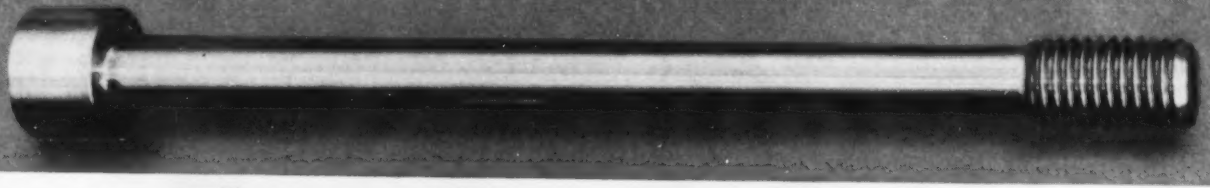
in One Chucking



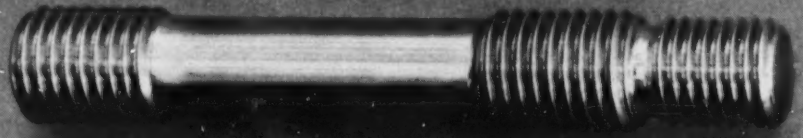
1785

LANDIS TOOL COMPANY / WAYNESBORO, PENNA., U. S. A.

Threading that's tough...or



Threading that's fussy...



it's just another job for

Here's why so many shops standardize on the Namco VERS-O-TOOL system

- One set of ground thread chasers produces more threads than 10 sets of radial hobbed and lapped chasers.
- The Namco Vers-o-tool System (with its patented Micrometer Grinding and Checking Gauge) takes the guesswork out of chaser grinding, for chasers are ground on their holding blocks so that when replaced in the head they will cut identical threads—without making trial cuts—without adjustments—without time or scrap loss.
- **Standard stockable NC and NF Chasers, also National Taper Pipe and Dry Seal carried in stock.**

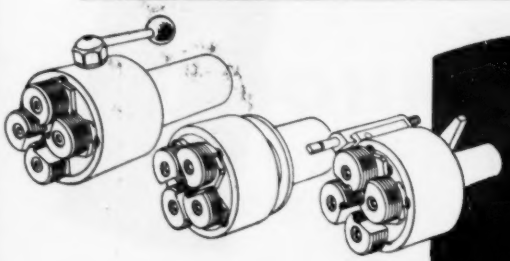
VERS-O-TOOL

These are all Class 3 threaded parts from 347 stainless steel—special threads having rounded tops and bottoms and with 32 micro finish specified.

No every day jobs to handle, these pieces, because the work-hardening tendencies of the material under cutting pressures call for the right tools and special caution to maintain the class and finish demanded.

Plenty of shops experimented with various methods of thread chasing and grinding but it remained for Screw Products Company in Cleveland to lick the job. They are using standard Vers-o-tools for diameters to 1" with standard ground thread circular chasers and are "having no trouble at all".

Doesn't this suggest your inquiry on threading work, either tough and fussy jobs or run of mine? Catalog DT-52 will help.



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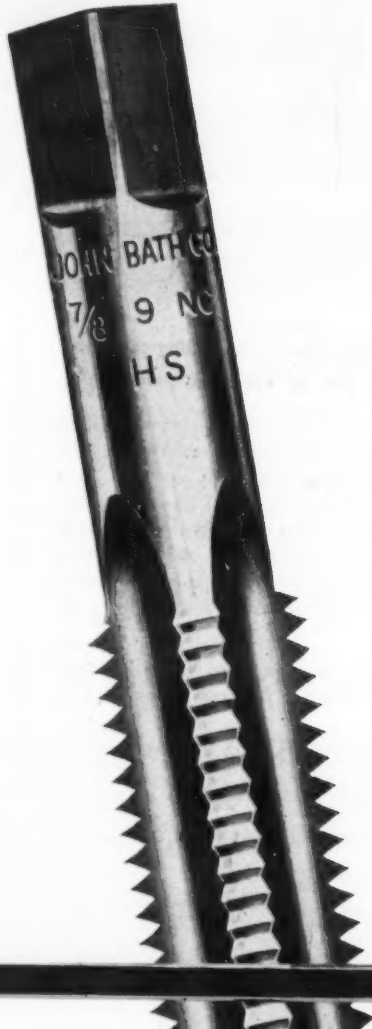
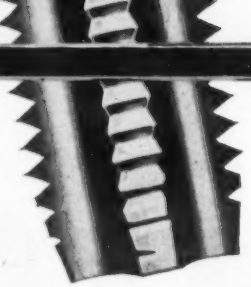
1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • Limit, Motor Starter and Control Station Switches • Solenoids • Contract Manufacturing.



The trained seal has earned a place in the entertainment world through an unusual sense of balance.

Balance



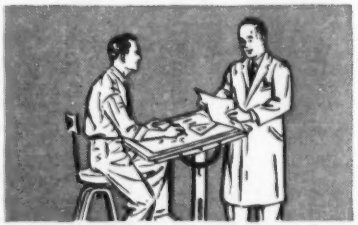
Bath Taps have earned a place in the world of precision tools because their "balance-in-motion" always assures a professional performance.

Check these basic built-in features:

UNIFORMITY — No variation. Steel is heat treated to uniform hardness before threads are ground.

CONCENTRICITY — No variation. Shanks, major diameter and flutes are ground on a common center.

CONTROL — No variation. Pitch diameter, lead, angle, flutes and chamfers are kept right "on the nose" for measure and spacing.



Bath engineers check every detail, to see that all Bath Taps are conditioned to do the best threading job for your requirements.

At Bath . . . all steps of manufacture are planned in harmonious relation to each other . . . to give the tap perfect functional balance for producing accurate threads to specifications.

For reliable, all-around, every-day thread cutting precision . . . buy Bath Taps. A Bath representative will be glad to show you how to balance your tap-production figures.

Insist on BATH TAPS for BETTER THREADS

JOHN BATH & CO., Inc.

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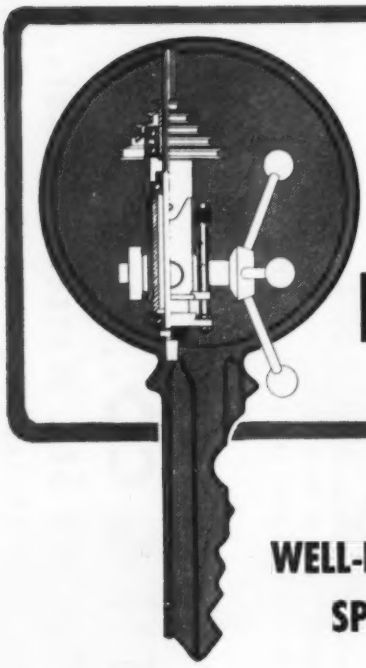
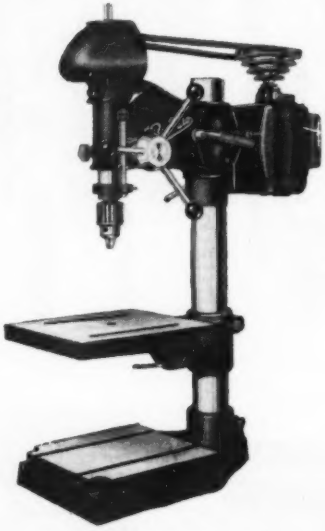
PLUG AND RING THREAD GAGES • GROUND THREAD TAPS • INTERNAL MICROMETERS



KEY TO A BETTER DRILL VALUE

—A WELL-DESIGNED SPINDLE



Note the long-life, accuracy and ease of operation designed into the spindle assembly of a "Buffalo" No. 15 Drill, above. Spindle is alloy steel, machined to close tolerances, ground and polished. Spindle and pulley turn smoothly without end play, on precision "sealed-for-life" ball bearings. Pulley and spindle are so accurately fitted to the spindle that up-and-down action is almost effortless, yet without play. WRITE TODAY for Bulletin 2963-C—see these and other features that mean lower cost output for you, with better-built "Buffalo" Drills!

"Buffalo" No. 15 Heavy-Duty Bench Drill

BUFFALO FORGE COMPANY

161 Mortimer St., Buffalo, New York

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo"

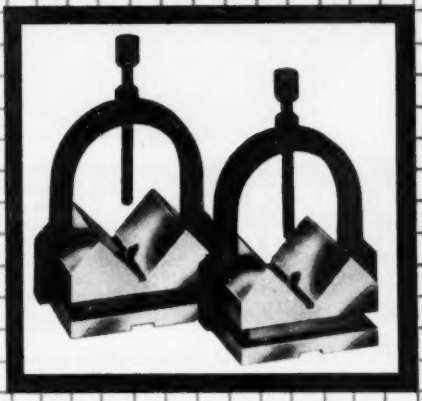
DRILLING • PUNCHING • SHEARING • BENDING

the perfect mate for all fine instruments of standards

UNI-V-BLOCK by Precision Tool

ACCURATE TO WITHIN .0002" T.I.R.

Made of close grain, stabilized Chrome-Moly alloy to guarantee precision results every time. The exclusive new FROZONE process, for hardness and stability, makes *UNI-V-BLOCKS the closest thing to absolute perfection, on the market today!*



Shown here is MODEL No. 3000 (2⅞ x 3¼ x 2¹¹⁄₁₆")

UNI-V-BLOCKS are also available as:

MODEL 5000 (4⅜ x 5⅛ x 5⅜")
MODEL 1250 (1¼ x 1⅛ x 1⅜")

FREE! WRITE NOW FOR MORE INFORMATION!

PRECISION TOOL & MFG. CO. OF ILLINOIS
1305 S. Laramie Ave., CICERO 50, Illinois MT6
Gentlemen Please send me complete data on the new UNI-V-BLOCK, at no obligation to me.

NAME
COMPANY
ADDRESS
CITY ZONE STATE

PRECISION TOOL & MFG. CO. OF ILLINOIS
1305 S. Laramie Ave., CICERO 50, Illinois

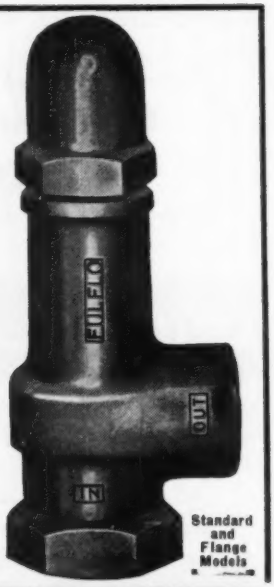
TRADE MARK

"FULFLO"

REG. U.S. PAT. OFF.

VALVES

By-pass, oil-relief piston type hydraulic



Standard and Flange Models

ALWAYS...MAINTAIN CONSTANT, UNIFORM HYDRAULIC PRESSURE

NO NOISE . . . NO MAINTENANCE

A merica's most dependable valves . . . select from 5 springs for desired pressure from 0# to 500# . . . and INSTALL, NO FURTHER ATTENTION NEEDED . . . EVER.

Standard and Flange models

Pipe sizes: ¼" to 2"; brass or cast iron bodies.

PROVED MOST SUCCESSFUL AND ECONOMICAL for machine tool hydraulic mechanisms, oil-burning equipment, rams, presses and Diesel engines.

WRITE—on your letterhead—for your personal copy of

FULFLO MECHANICAL DATA BOOK.

Specify if for Valves, for Pumps or for both.

FULFLO

THE FULFLO SPECIALTIES CO. Inc.

PUMP AND VALVE MANUFACTURERS

BLANCHESTER, OHIO

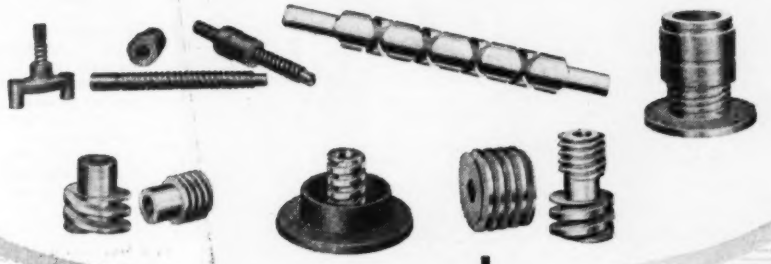
The COULTER "L1"

AUTOMATIC THREADING LATHE

. . . is so versatile that hundreds
of diameters and lengths of threads
can be produced on it, without limitations . . .

FASTER—ACCURATELY—AUTOMATICALLY!

It could be your solution to low cost threading! GET the facts!



The James Coulter Machine Co.
637 Railroad Ave. Bridgeport 5, Conn.

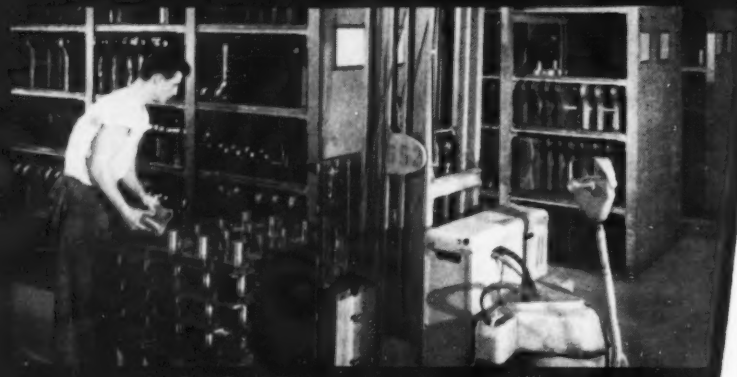
Machine Tool
BUILDERS
Since 1896

At Danly's Chicago Plant . . . final broaching to assure accurate sizing and parallelism of guide post and bushing holes

World's fastest die set service speeds up your tooling program

DANLY

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue
Chicago 50, Illinois



At a Danly Branch Plant complete stocks of die set components ready for assembly to your order

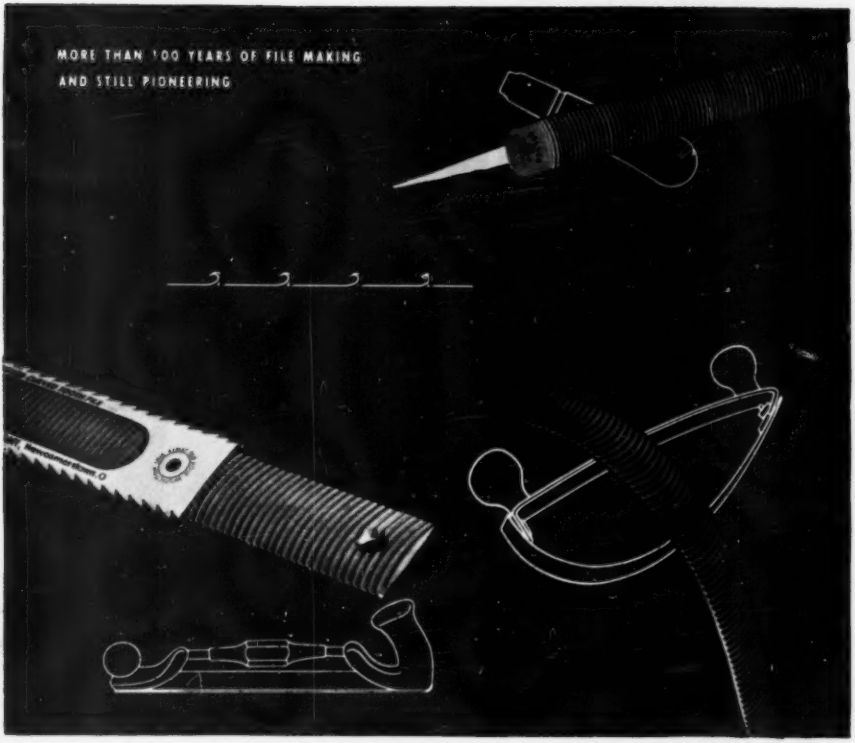
Danly's new, faster service starts at the main Danly Plant in Chicago where two unique, high-speed, mass production lines are devoted exclusively to the manufacture of interchangeable, precision die set parts. Stocked by Danly Branch Plants in major toolmaking centers, these interchangeable parts are quickly assembled to make up the size and type of die set you need—and delivered to you only a few days after your order is received. Make a note right now of the Danly Branch nearest you from the list given on this page. Next time you need die sets, give your Danly Branch a call. See how they can meet your needs from stock . . . and save you time with fast, local service.

*CHICAGO 50
2100 South Laramie Avenue
*CLEVELAND 14
1550 East 33rd Street
*DAYTON 7
3196 Delphos Avenue
*DETROIT 16
1549 Temple Avenue
*GRAND RAPIDS
113 Michigan Street N.W.
INDIANAPOLIS 4
5 West 10th Street
*LONG ISLAND CITY 1
47-28 37th Street

Fast Nationwide Delivery From These Branches

*LOS ANGELES 54
Ducommun Metals & Supply Co.
4890 South Alameda
MILWAUKEE 2
111 East Wisconsin Avenue
*PHILADELPHIA 40
511 W. Courtland Street
*ROCHESTER 6
33 Rutter Street

*Indicates complete stock



HELLER WAS FIRST WITH *VIXEN** MILLED CURVED-TOOTH FILES

Originated by Heller Brothers over 35 years ago, the Vixen still stands as the greatest single improvement ever made in metal finishing files. Each curved-tooth is actually a miniature milling cutter. Vixen cuts faster, freer, finishes smoother. File clears easily even when used on soft, non-ferrous metals or fibrous materials. Famous Vixen is only one of many Heller contributions to better filing. Over a century of continuous inspecting, testing and improving guarantees users of Heller files "the best."

other Heller *Firsts*

NUCUT* Wavy-Teeth Files
SPIRAL-CUT Half Round Files
WAVY-TEETH* Double Cut Mill and Saw Files

*Registered T.M.

VIXEN
American-Swiss
NUCUT

THESE 3 FAMOUS BRANDS ARE MADE ONLY BY

HELLER BROTHERS SINCE 1836

HELLER BROTHERS CO. *America's Oldest File Manufacturer* **NEWCOMERSTOWN, OHIO**

YOUR *HELLER* DISTRIBUTOR CAN SUPPLY ALL YOUR FILE NEEDS

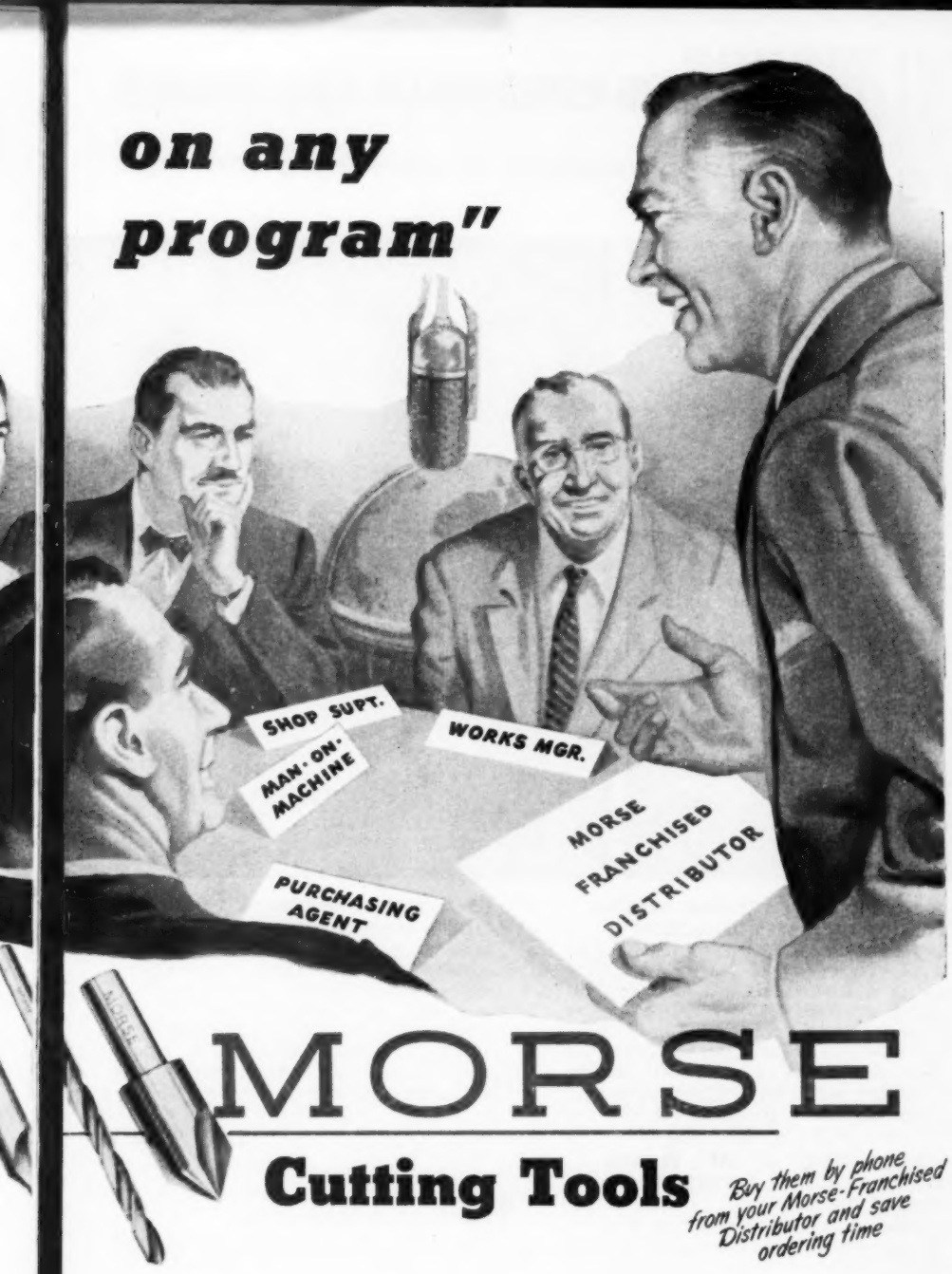
He scores highest cutting-tool "quiz

...your Morse-Franchised Distributor!

No matter who brings up the tough questions on cutting-tool applications, your Morse-Franchised Distributor has the *right* and *ready* answers. Plus the hard-earned practical experience to go out in your plant with your men and prove the soundness of his recommendations.

Yes, he helps you to get the most for your money out of the finest and most complete line of cutting tools that money can make . . . *the* Morse Line of Drills, Taps, Dies, End Mills, Counterbores and Cutters. So when *you* need the right answers *right now* to a tough problem in cutting tool application, call your Morse-Franchised Distributor. He'll guide you right and save you money . . . *every time.*

MORSE TWIST DRILL & MACHINE COMPANY
NEW BEDFORD, MASSACHUSETTS
(Division of VAN NORMAN CO.)
Warehouses in New York, Chicago, Detroit, Houston, San Francisco



MORSE

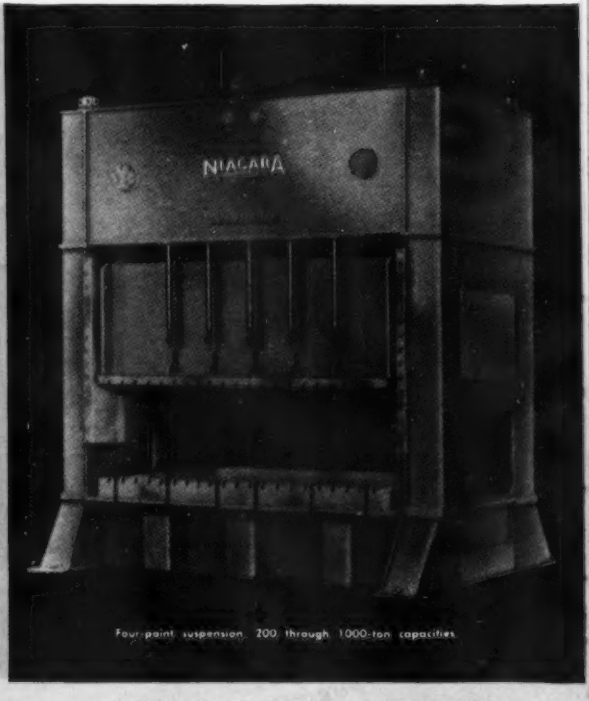
Cutting Tools

Buy them by phone from your Morse-Franchised Distributor and save ordering time

NEW! MASTERFULLY ENGINEERED

excels in large, heavy tonnage

One-point suspension. 100. through 1000-ton capacities



Four-point suspension. 200. through 1000-ton capacities

ECCENTRIC DRIVE DELIVERS GREATER TORQUE WITH LESS DEFLECTION

In Niagara Series SE Presses, the eccentric is an integral part of the main gear (or gears) which rotates on a stationary pin rigidly supported in the crown, close to the point at which the pressure is exerted. Serving merely as a pivot, the pin carries no torsional load and relatively little bending load. Net result: Niagara's eccentric gear design can deliver greater torque with less deflection than other types of construction.

RUGGED, RIGID, ALL-STEEL FRAMES PROVIDE GREATER ACCURACY, LONGER DIE LIFE

Frames are rugged, all-steel, four-piece, tie rod construction of great strength and rigidity, stress relieved in a furnace and thoroughly grit-blasted before machining. Each frame size has been scientifically tested for deflection to meet Niagara standards — the most exacting in the industry.

LOW INERTIA, PNEUMATIC FRICTION CLUTCH RUNS COOLER, WEARS LONGER

Most of the weight of the Niagara clutch continues to rotate with the flywheel. Only the drive shaft and driving plate start and stop with each cycle. The resulting low weight and inertia of the parts, picked up during clutch engagement, greatly reduce heat and wear. As the clutch rotates, it acts as a centrifugal blower, providing positive ventilation. Plates automatically compensate for normal wear, with no adjustment necessary.

MODERN, STREAMLINED DESIGN EMPHASIZES COMPACTNESS

The entire driving assembly is neatly housed in the crown. There is no exposed, overhanging flywheel, clutch, brake, shaft nor motor in the rear of the press to obstruct crane service, block light, throw grease or consume space unnecessarily.

LINE OF METALWORKING CHAMPIONS

drawing, punching and blanking work

Two-point suspension, 200 through 1000-ton capacities.

Without equal in engineering design, performance and stamina, this great new line of Niagara Straight Side Eccentric Geared Presses is every inch a champion. It is an outstanding example of the advanced thinking that has made Niagara the pace-setter among builders of metal working machines for 75 years.

Masterfully engineered and ruggedly constructed to handle a tremendous variety of work, the new Niagara SE Series is the most practical and dependable press line built for:

- **Work requiring large die areas.**
- **Heavy tonnage demands.**
- **Long stroke, deep drawing jobs where work is engaged high up on the stroke.**
- **Bottom-of-stroke blanking and punching.**

THE COMPLETE STORY IS READY FOR YOU NOW!
Make a feature-by-feature appraisal of what these great new presses can do for you. Write for newly published, illustrated Bulletin 66. It will be forwarded promptly without obligation.

NIAGARA MACHINE & TOOL WORKS • BUFFALO, 11, N.Y.
DISTRICT OFFICES: DETROIT • CLEVELAND • NEW YORK • PHILADELPHIA
Dealers in principal U. S. cities and major foreign countries.

DELUXE OPERATING CONTROLS INSURE UTMOST SAFETY, EFFICIENCY AND CONVENIENCE

Compactly and conveniently arranged on a master panel, Niagara controls are instantly accessible for fingertip direction of every press operation: starting, slide adjusting, jogging, die tryouts, running and stopping. The latest safety devices provide maximum protection for die setter, operator and the press itself. Nothing has been overlooked. Trial runs assure that all controls are in proper working order before each Niagara press leaves the plant.

NIAGARA

STRAIGHT SIDE
ECCENTRIC GEARED
PRESSES

America's Most Complete Line of Presses, Shears, Machines and Tools for Plate and Sheet Metal Work

NIAGARA MACHINE & TOOL WORKS 1879 75 1954

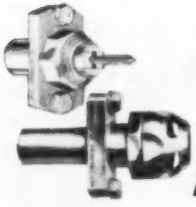
ALCO
DRILL CHUCKS

COMPLETE RANGE
OF SIZES FOR DRILLS
FROM 1/32" to 1"

ALCO Drill Chucks hold drills securely without using bushings. This chuck is full floating so that absolute concentricity is maintained, resulting in precision drilling.

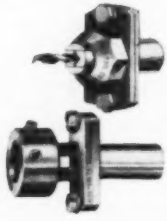
ALCO Drill Chucks fit all screw machines and each size has a wide range of adjustability so that one chuck will hold various sizes of drills. Your drills will last longer because they will run true on centers, and will produce perfect work.

Send for complete catalog or any engineering data.



THE ALCO TOOL COMPANY
52 Birdseye St., Bridgeport, Conn.

ALCO EFFICIENT TOOLS

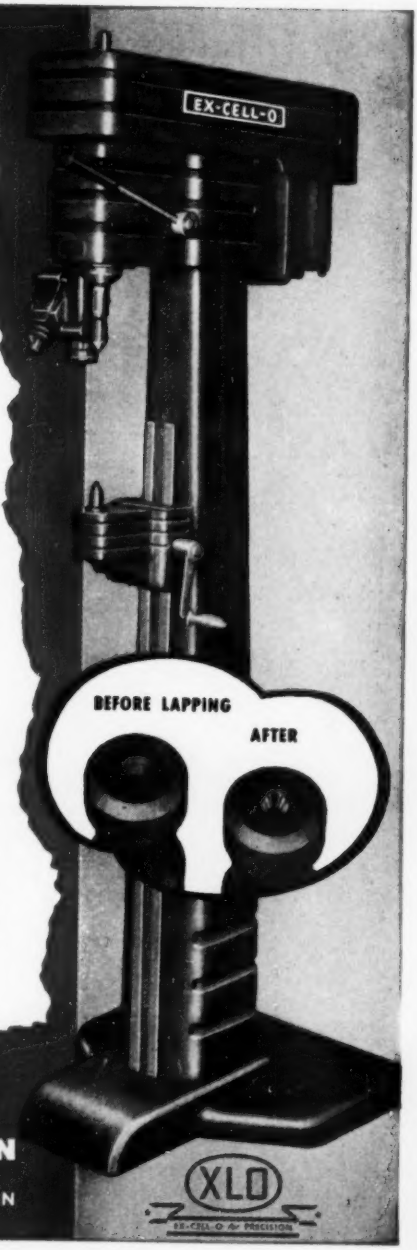


For Precision Between Centers

EX-CELL-O

CENTER LAPPING MACHINES

Meeting today's precision standards requires careful checking of every phase of the job, *including the center holes in the work.* Ex-Cell-O Center Lapping Machines correct inaccuracies of center holes that affect the quality of all subsequent operations performed between centers. These machines are precision built and are easy to operate. They are fully described in Bulletin 40271—a copy is yours for the asking.

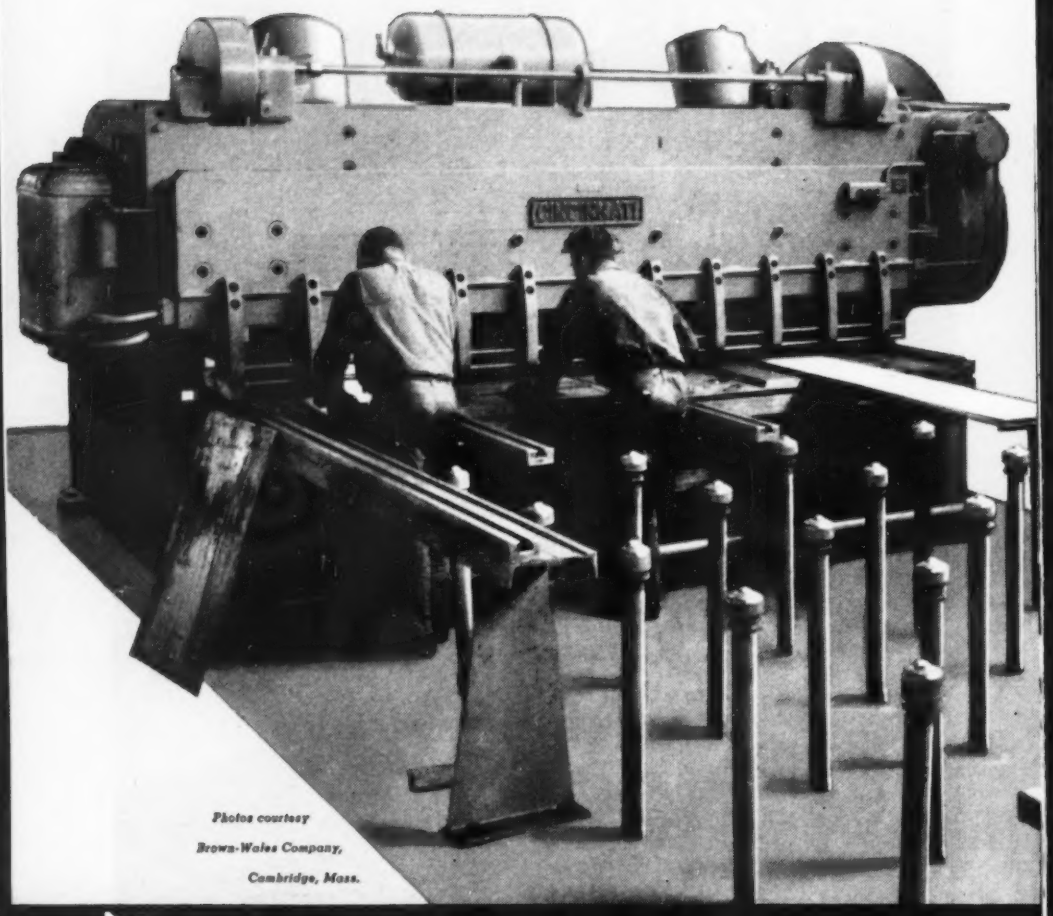


EX-CELL-O CORPORATION

DETROIT 32, MICHIGAN

Test cuts

by accurate performance of



Photos courtesy
Brown-Wales Company,
Cambridge, Mass.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A.

SHAPERS • SHEARS • BRAKES

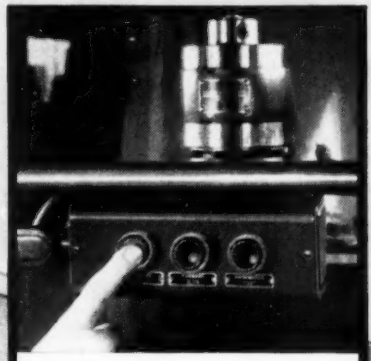
eliminated CINCINNATI Shears...

Brown-Wales Company says:

"As a steel warehouse, we have comparatively few production jobs, however, we have found that our men with this new shear can turn out far more work in an hour or a day than they could with the old one. In the first place, the power operated back gauge is a great time-saver when changing, as we frequently do, from one job to another.

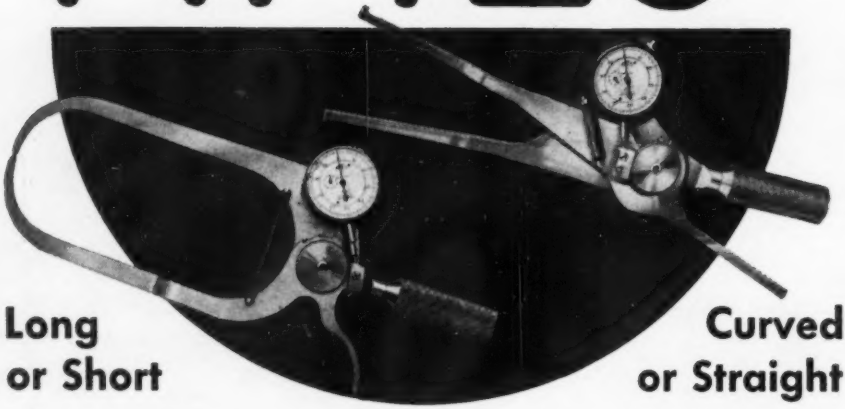
"Secondly—the greater accuracy of the shear has made test cuts unnecessary, so that down time between runs is greatly reduced."

Write for Shear Catalog S-6.



The Buttons that save time. The great time-saver—the Cincinnati front controlled Power Back Gauge.

AMES

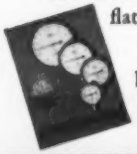


Long or Short

Curved or Straight

CALIPER GAUGES—Custom-built to fit your exact need.
Whether it's measuring the inside dimensions of a pipe, the wall thickness of a casting, the outside dimensions of a rocket—Ames can build the caliper gauge that fills your requirements.

Ames caliper gauges are made of carefully-finished heavy gauge steel and are equipped with an Ames exclusive: a chordal error correcting cam that assures accurate readings. Ames calipers are available with contacts of various shapes—ball, flat or pointed—made of carbide, hardened steel, or sapphire.



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Your measuring problems may involve a caliper gauge. If so, send it to Ames—for a quick, profitable solution.

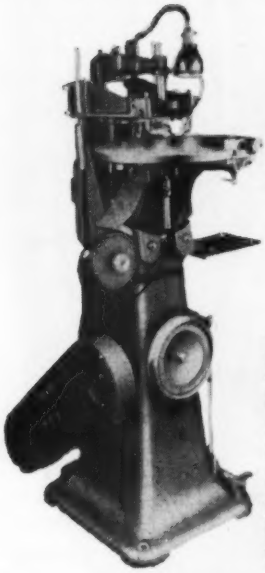
Representatives in principal cities.

B. C. AMES CO. *29 Ames Street Waltham 54, Mass.*

Mfgr. of Micrometer Dial Gauges • Micrometer Dial Indicators

You, Like Thousands of Others, Can Cut Die Making Costs

with OLIVER DIE MAKING MACHINES



Dependable and proved are OLIVER Die Makers. They reduce costs as much as 60% because they simplify sawing, filing and lapping operations. The Oliver Method saves time and does not require expensive, hard-to-get skilled labor. These efficient, speedy and accurate machines have proved themselves in more than 10,000 installations throughout the world. In many plants these durable OLIVERS have been in constant use for over 25 years.

For nearly 40 years OLIVER DIE MAKING MACHINES have been found invaluable on such jobs as Production Filing, Experimental Work, Metal Patterns, Cams, Gages, Templates, etc. Improve *your* toolroom efficiency . . . For *better* dies—saw and file with OLIVER DIE MAKING MACHINES.

OLIVER DIE MAKERS *Available in 5 Models*

The Bench Model S-1 (illustrated) is a single speed die maker for use on tool steel up to 1" thick.

The Heavy Duty Model (illustrated) has 6 speeds, works in metal up to 3" thick, has variable strokes to 5" with hydraulic feed.

***Write Today For Complete Technical Data on* OLIVER DIE MAKERS**
See our catalog in Sweet's Directory

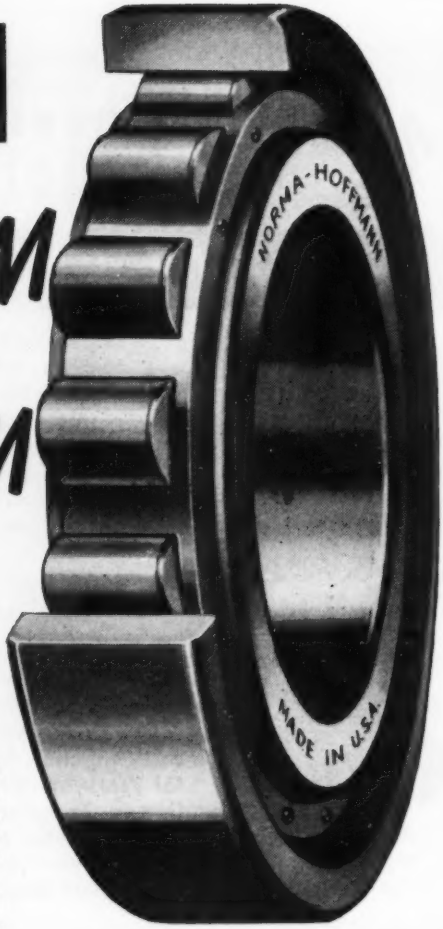
MACHINE TOOLS by OLIVER include:
AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS
DRILL POINT THINNERS
TEMPLATE TOOL GRINDERS
FACE MILL GRINDERS
DIE MAKING MACHINES

OLIVER INSTRUMENT CO.

1408 E. MAUMEE • ADRIAN, MICHIGAN

Norma-Hoffmann
PRECISION MADE
Roller Bearings

Give you MAXIMUM Capacity in MINIMUM Space



And equally important — they are interchangeable with single-row ball bearings

If your bearings must operate under such severe conditions as high speeds, heavy loads, temporary overloads, shock or vibration, *then Norma-Hoffmann Roller Bearings are the ones to use.* Here's why —

- Solid cylindrical rollers between cylindrical races provide maximum load contact area, increased steady load capacity, and a larger shock-absorbing capacity than any other type of single-row bearing.
- A safety factor margin ample for temporary overloads up to 50% beyond normal rating, as under peak loads, in unusually severe duty, or under shock conditions.
- Large contact area with the most efficient load distribution provides greater wear-resisting surfaces, assures true rolling between rollers and raceways, results in minimum friction between roller and cage.
- A lower friction coefficient under heavy load than any other type of bearing permits.
- Speedability equal to that of any ball bearing, size for size, up to 35,000 R. P. M.

Write for catalog or engineering assistance.

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NORMA-HOFFMANN BEARINGS
BALL • ROLLER • THRUST

NORMA-HOFFMANN BEARINGS CORPORATION
STAMFORD, CONNECTICUT - Founded 1911

Finally – A FIXTURE THAT MAKES FORM RELIEF PRACTICAL!

THE NEW ROYAL OAK UNIVERSAL FORM RELIEVING FIXTURE

TAPS • SPHERICAL CUTTERS • PROFILE MILLS
REAMERS • COUNTERBORES • HOLLOW MILLS
CENTER DRILLS • STEP TOOLS • BORING BARS

Increased life, better performance for practically all end and side cutting tools is now possible. New design gives traverse, not rocking, action with tool remaining on wheel center. Set-up so fast and simple you can standardize on this better grind for tools of 1 to 16 flutes. Easy cam interchange – selective degree of relief without changing cams.

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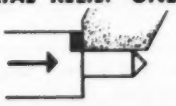
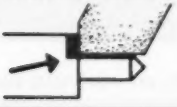
GRIND

RADIAL RELIEF ONLY

AXIAL RELIEF ONLY



ANY COMBINATION OF AXIAL AND RADIAL RELIEF



GRINDER DIVISION
ROYAL OAK TOOL & MACHINE CO.
29500 STEPHENSON HY.
ROYAL OAK, MICH.

So many standard styles ... one must be just right for you!

For more than 66 years we have been producing metal-working tools and adding to our standard line. Our aim was, and is, to have the tools you need **immediately available** when you need them—at regular **low, standard prices.**

Today we keep such an extensive range of styles and sizes of PUNCHES and DIES on hand that we can fit most makes of hand, foot, and power operated punch presses from stock.

SEND FOR OUR COMPLETE CATALOG SHEETS. SEE HOW YOU CAN SAVE TIME AND MONEY WITH LEWTHWAITE TOOLS.

T. H. LEWTHWAITE MACHINE CO., INC. 312 E. 47th St., N.Y.C.

People work better when they SEE BETTER

AT IBM

IBM model shop worker using MAGNI-FOCUSER *on a filing operation for a business machine part at the company's Endicott, N. Y. plant.*

MAGNI-FOCUSER'S matched prismatic lenses give needle-sharp magnification. Comfortably light weight. Fits over regular glasses. Leaves both hands free. Normal vision may be resumed by lifting head.

MAGNI-FOCUSER

SPEEDS PRODUCTION

Leaves both hands free to work

Magni-Focuser—the binocular magnifier—reduces eye-strain and *prevents squinting*—thereby speeding production, increasing accuracy and minimizing the chance of errors and accidents.

Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeing aid.

Magni-Focuser can help your plant produce better. Immediate delivery. 10-day trial without obligation. Return to us if not satisfied. $10.50.

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Gives true third-dimensional ("3-D") vision

EDROY PRODUCTS CO. 480 Lexington Ave., Dept. 14, New York 17, N. Y.

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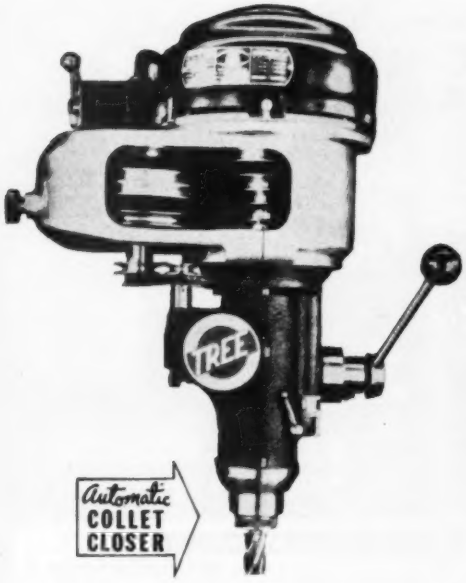
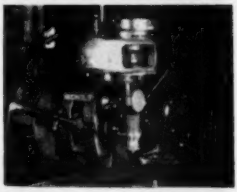
VERTICAL MILLING CAPACITY?



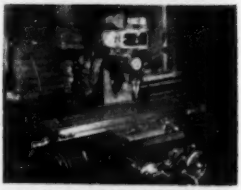
Cincinnati

Nichols

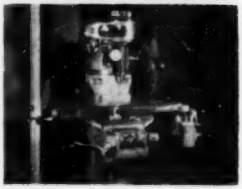


Kempsmith

Milwaukee



Bridgeport



You can add vertical milling capacity by adapting the versatile TREE MH-4 Vertical Milling Attachment to your present horizontal milling machine. The MH-4 gives you all angle milling, drilling and boring with a high degree of accuracy because of its built-in rigidity. Spindle — alloy steel, hardened and ground Roller drive eliminates back-lash. Quill — 4 inch travel. Enclosed micrometer depth stop. Power feed. Write today for full information.

EXPORT ADDRESS: States Trading Co., 401 Brdwy., New York 13, Cable Address; "STRADESO"

TREE TOOL AND DIE WORKS

1600 JUNCTION AVENUE RACINE, WISCONSIN

INCREASE PRODUCTION • CUT COSTS • IMPROVE QUALITY

....with

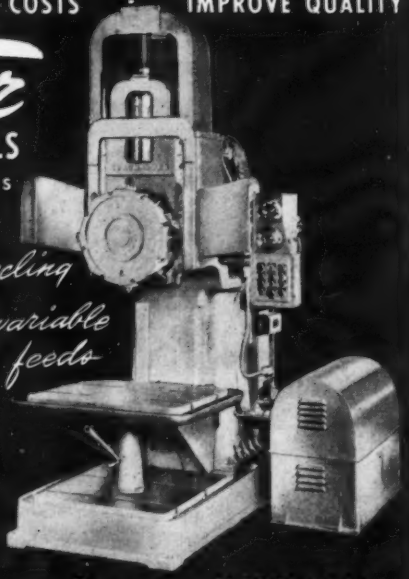
Burgmaster

TURRET DRILLS

.... now available in 3 models

skip-indexing
automatic cycling
infinitely variable preselective feeds

6 SPINDLE MODEL 2BH
AUTOMATIC • HYDRAULIC



8 SPINDLE MODEL 3BH
AUTOMATIC • HYDRAULIC

6 SPINDLE MODEL 2A
MANUAL

SPECIFICATIONS:

	MODEL 3BH	MODEL 2BH	MODEL 2A
Drill capacity, mild steel	1¼"	¾"	¾"
Ram travel	12"	8"	8"
Spindle speeds, preselective	12	12	12
Speed range	115-1700	225-3000	225-3000
Depth control	Preselective	Preselective	Preselective
Throat depth	19½"	12"	12"
Table work surface	25"x 35"	17"x 34"	17"x 34"
Table travel	19"	19"	19"
Max. cl'rance, spindle to table	32"	23"	23"
Max. diameter tool clearance	9"	4½"	4½"
Motor, 2-speed, 1800/900	10/5 H.P.	2/1 H.P.	2/1 H.P.
Weight, approximate	7000 lbs.	2500 lbs.	1800 lbs.
Height	120"	78"	72"
Floor space, approximate	6'6"x 5'4"	60"x 51"	38"x 51"

WRITE TODAY FOR DETAILED INFORMATION

BURG TOOL MFG. CO. Dept BB-9

P.O. BOX 48 • GARDENA, CALIFORNIA

CONVERT YOUR PRESSES TO AUTOMATIC OPERATION WITH U. S. AUTOMATIC PRESS ROOM EQUIPMENT

You can obtain all the advantages of automatic operation in your press room with U.S. Equipment. U.S. Slide Feeds, Stock Reels, Straighteners, Coil Cradles, Scrap Choppers, etc. are designed and built to provide increased efficiency, greater production, material savings and reduced labor costs in the fabrication of stampings. The photograph—courtesy of Whirlpool Corp., manufacturers of home laundry equipment—illustrates a set-up of U.S. Automatic Press Room Equipment in use at their plant.

U.S. PRODUCTS

SLIDE FEEDS
ROLL FEEDS
STRAIGHTENERS
STOCK REELS
COIL CRADLES
OILERS — WIPERS
SCRAP CHOPPERS
MULTI-STOP
U.S. MULTI-SLIDES
U.S. MULTI-MILLERS

U.S. Slide Feeds are recognized as the most accurate automatic feeds in the market. They can pull material, within their capacity, through a plain stock straightener and still maintain controlled accuracy. Bulletin No. 80-B contains complete specifications. Write for your copy.

U.S. TOOL COMPANY, Inc.

AMPERE (East Orange) NEW JERSEY

TREET-ALL

the HEVI DUTY *Multi Purpose* FURNACE

for

TOOL ROOM AND EXPERIMENTAL HEAT TREATING

With a maximum temperature of 1850° F., the TREET-ALL can easily handle your scale free hardening, carburizing, dry cyaniding and silver brazing.

The alloy muffle and gasketed door form a tight seal which simplifies atmosphere control. The furnace, quench tank, cabinet and controls form a compact, completely wired unit.

Write for Bulletin HD-1147-BB

HEVI DUTY ELECTRIC COMPANY

HEAT TREATING FURNACES HEVI-DUTY ELECTRIC EXCLUSIVELY,
DRY TYPE TRANSFORMERS — CONSTANT CURRENT REGULATORS
MILWAUKEE 1, WISCONSIN

REPLACE *Obsolete* TAPPING HEADS NOW!

Modern Procunier Tappers are Streamlining Production Methods . . . Everywhere!

If you are now using ancient, troublesome tapping equipment, you are needlessly increasing operating costs, seriously impairing production and adding to your maintenance expense. Out-of-date, over-used models are incapable of attaining the streamlined efficiency that modernized industry is demanding. Progressive industrial users who recognize the need for high speed, accuracy and efficiency, are turning to Procunier Tappers as the solution to their steadily mounting production and spoilage costs. Procunier Tappers invariably produce more pieces per hour with fewer rejections, fewer spoiled pieces and a minimum of broken taps.

Designed for today's tough production conditions, they incorporate many unique and exclusive construction and operating features. Best of all, they're made to "take it" and provide you with many more profitable "operating hours" and less costly down time interruption.

Procunier tapping heads are priced low enough to make it economically possible to rid your plant of obsolete tapping heads NOW!

New "Tru-grip" Tap Holder

Write for FREE Brochure

giving full details, specifications, diagrams and work drawings on the complete line of Procunier tapping heads and accessories. See how they can fit into your present plant pattern.

Visit Our Booth No. 1621 At The ASTE Show

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Gentlemen: Please send your illustrated brochure giving complete details, specifications and prices on the improved line of Procunier High Speed Tapping Heads.

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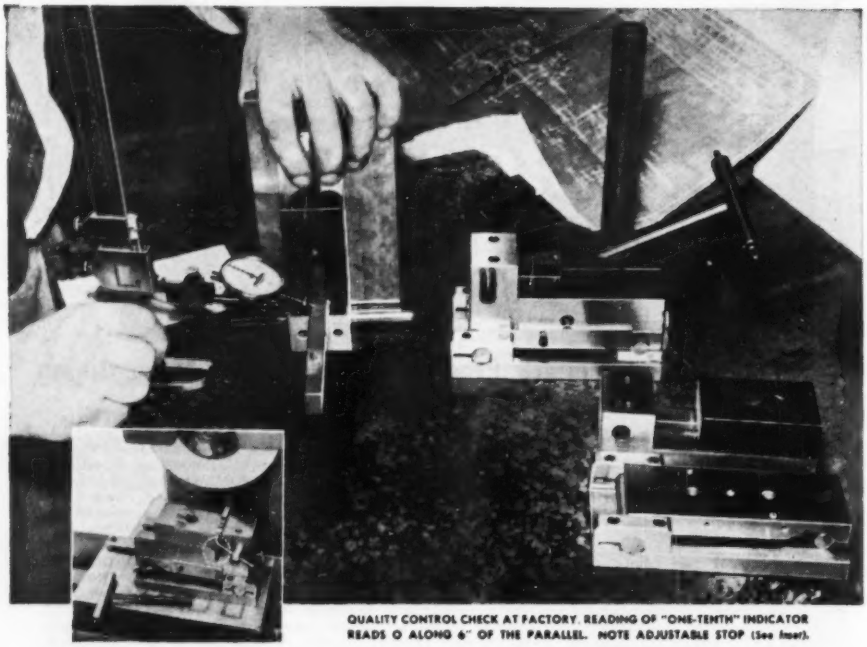
Address.....

City..... Zone..... State.....



QUALITY CONTROL CHECK AT FACTORY. READING OF "ONE-TENTH" INDICATOR READS 0 ALONG 6" OF THE PARALLEL. NOTE ADJUSTABLE STOP (See Inset).

New J & S Precision Grinding Vise square within 0.0001" or less in 1" in 4 positions

Hardened, Ground and Lapped—Deep Frozen for Stabilization—
Holds Tapered Diameters and Odd-shaped Workpieces

For inspection, grinding, milling, drilling and tapping, jig boring, layout work . . .

This new J & S "Square-perFect" Vise is one of the most practical precision vises ever developed. Its many helpful features explain why:

It is square, for example, with 0.0001" or less in 1" in 4 positions. It is attachable to J & S 5" sine bar with 0.100" recess for small angles.

Accurate, Adjustable Stop

Like all J & S workholding tools, it has a unique downholding clamping action. This assures dependable, accurate positioning of workpieces. An adjustable stop provides fast, *sure* positions for repeat operations. Workpieces can be loaded and unloaded rapidly.

Holds Tapered, Odd-shaped Workpieces

The clamping jaw of this J & S Precision Grinding Vise swivels to permit holding of tapered and odd-shaped workpieces. It holds round stock from 1/16" to 2 1/2" in diameter in Vee-block fashion. The range of jaw openings is from 0" to 3".

Get all the facts without delay. Fill-in the coupon and mail it today.

J & S TOOL CO., INC.,
647 W. Mt. Pleasant Ave., Livingston, N. J.

Please send me complete information on your J & S Precision Grinding Vise.

NAME.....

COMPANY.....

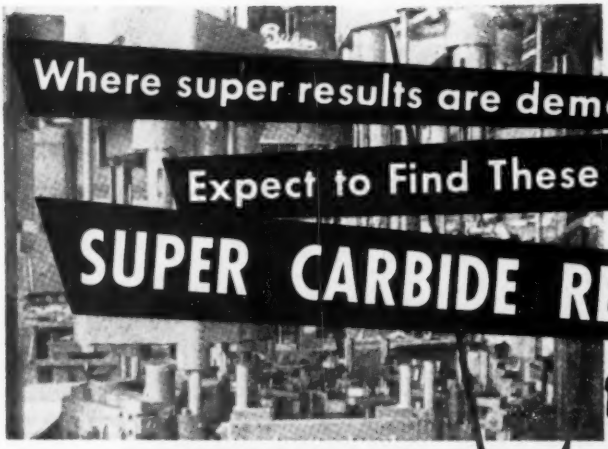
STREET.....

CITY.....STATE.....

J&S TOOL CO., INC.

WHEEL DRESSERS • JAW CLAMPS • PRECISION VISES • SINE BARS • DOWN-HOLDING DEVICES

647 W. Mt. Pleasant Ave., Livingston, New Jersey

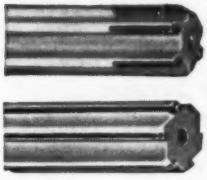


Where super results are demanded

Expect to Find These . . .

SUPER CARBIDE REAMERS

Super Tool has always been proud to offer the most complete standard line of carbide tipped and solid carbide reamers in the industry—all types and complete range of sizes stocked for your convenience



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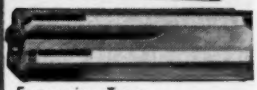
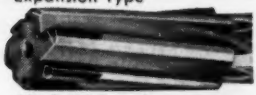
A NEW CUSTOMER SERVICE —

SEMI-FINISHED REAMERS

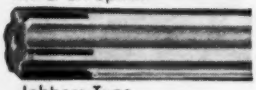
Stocked in a complete range of sizes in regular and flute-long types, in both straight and tapered shanks with allowable grinding stock. You can grind to required diameter specification with a minimum of delay. No need to worry over emergency break-downs or short run jobs. Simply maintain your own stock of selected nominal sizes. Ask for this new listing with substantially reduced prices and place your requirements now.



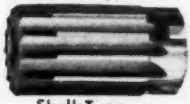
Expansion Type



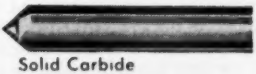
RH & LH Spiral



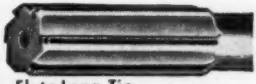
Jobbers Type



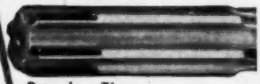
Shell Type



Solid Carbide



Flute-Long Tip



Regular Tip

Super TOOL COMPANY

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FLAT LAPPING OF METALS

A view of our experimental lapping laboratory. In 1953 we proved to over 200 manufacturers that lapping was profitable and solved their problems.

Our lapping laboratory is also equipped with the finest checking instruments to insure an accurate report of every experimental job.

How to find out if you need . .

Precision Flatness, Finish and Parallelity in Production Quantities

and how to get it

Over 500 manufacturers of industrial equipment including pumps, compressors, valves and controls plus many of the largest automotive and aircraft plants have found production lapping a great time and money saver in their operations. In many cases gaskets between mating surfaces have been eliminated, while in others a closer tolerance has brought about a tremendous improvement in product performance. The extreme high production accuracy of the Lapmaster (Micro-inch finishes of 2 to 3 RMS—surface flatness to less than .000011" when required) have amazed and sold many production men. This accuracy has been definitely proven on practically all materials including cast iron, steel, stainless steel, aluminum, brass, carbon, ceramics, plastics and sintered metals.

Our Lapping Laboratory Is At Your Service

There is one sure way to find out if lapping is practical and profitable for you with no strings attached. We invite you to send us a few sample parts including surface finish specifications and approximate production requirements. The parts will be lapped in our laboratory shown above and returned to you with complete facts including data on number of finished parts per hour and recommended Lapmaster size to do the work. Many companies, large and small, have already taken advantage of this free service. In a majority of cases the Lapmaster has proven its use. Why not find our for *yourself* today.

Crane Packing Co., Dept. BB-9, 1812 Cuyler Ave., Chicago 13, Ill.
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Additional Data
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JOHN CRANE

CRANE PACKING COMPANY

Cuts Metal 15 Times Faster than Hand Hack Saw!

NEW . . . Porter-Cable Portable Band Saw

only $215.00

Slices through 1½" cold rolled steel in 41 seconds! That's fifteen times faster than a good man with a hack saw . . . *two-and-a-half times faster* than bulky power hack saws!

You can use this 16-pound work-demon anywhere—on ferrous or non-ferrous metals or "problem" materials. Take it into equipment yards, stock bins . . . tight spots where costly hand sawing is the only other answer. Use it for general maintenance, teardowns. Compact, easy to handle, Porta-Band delivers smooth controlled sawing in any position. Only the cutting part of the blade is exposed. Cutting action pulls the blade snugly into cut, holding saw firmly in place.

Powered for heavy duty . . . perfectly balanced . . . Porta-Band handles the toughest assignments. Band speed of 240 feet per minute insures swift, smooth cutting of all materials up to 3¼" diameter round, or 3¼" x 4¼" rectangular. Highest grade precision ball and needle bearing throughout. Aluminum alloy frame for lightness, toughness. Universal 115V AC-DC, 25-60 cycle motor (230V available at extra cost).

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Porter-Cable
Quality Electric Tools

PORTER-CABLE MACHINE CO.
2329 N. Salina St., Syracuse 8, N. Y.

(In Canada, send to: Strongridge, Ltd., London, Ont.)

Send full information on Porta-Band and name of nearest dealer.

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Manufacturers of Speedmatic and Guild Electric Tools

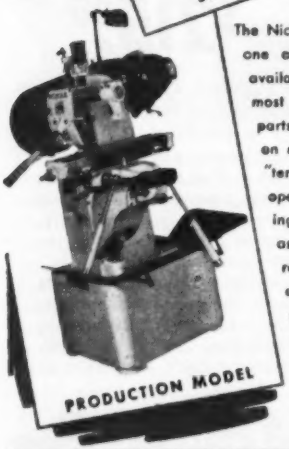
STANDARD MODEL

Nichols Miller

TOOL ROOM MODEL

. . . a complete line

The Nichols Miller, with "rise-and-fall" spindle, is one of the most precise, universal machines available today. The four models shown, fill most basic requirements—whether for single parts with simple set-up, or multiple operations on mass production jobs with tolerances to "tenths". Their versatility makes possible such operations as facing, boring, recessing, turning, slotting, key seating and contour milling, as well as regular milling. According to requirements, screw or lever longitudinal and transverse table feeds are available optionally. "The miller that uses its head" is your best choice—and one of industry's greatest values. If you want production to "tenths", investigate the Nichols Miller.



PRODUCTION MODEL

SEMI-AUTOMATIC MODEL

"the miller that uses its head!"

Write today for the Nichols general catalog, which describes the six models of Nichols Millers. A sound, color movie "The Miller that Uses its Head" is available for free showing. May we reserve it for you?

CONDENSED SPECIFICATIONS

Table Working Surface	6¾" x 21" or 30"
Longitudinal Travel (screw or lever)	10" or 19"
Transverse Travel (screw or lever)	7"
Vertical Travel — Knee	13½"
Rise and Fall of Spindle	4½"
Selective Speed Ranges up to 5000 R.P.M.	
Weight	1250 lbs.

MANUFACTURED BY W. H. NICHOLS COMPANY WALTHAM, MASSACHUSETTS

NATIONAL DISTRIBUTORS **NICHOLS-MORRIS CORPORATION**

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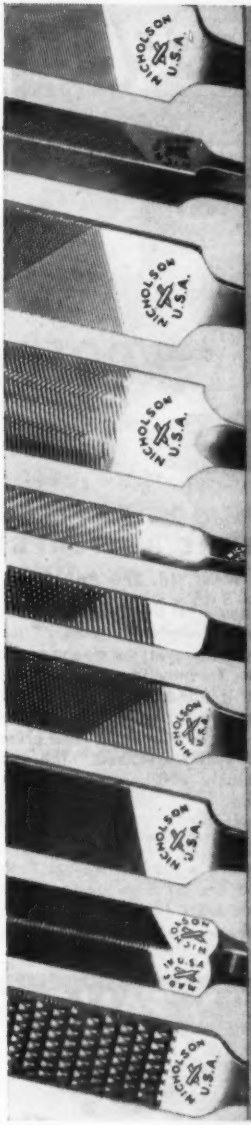

QUALITY PROVED BY PERFORMANCE

There's no mistaking a champion—in any field. By cleanness, straightness and other outward appearances, Nicholson and Black Diamond brands reflect their leadership in the field of files. But *performance* brings out a lot more—like: the high efficiency of their accurately cut teeth, scientifically determined hardness, high-quality steel.

Constant engineering research has also kept Nicholson right in stride with the forward movement in shop practices and materials, as evidenced by many Nicholson developments in Special Purpose and Swiss Pattern (X.F. brand) files.

Nicholson is always alive and alert toward giving you a comprehensive file service and the utmost in file values.*

BUY THROUGH YOUR INDUSTRIAL DISTRIBUTOR

***SEND FOR "FILE FILOSOPHY"** for a larger picture of the products of the world's foremost file manufacturer. Invaluable to purchasing and production heads. **FREE.**

REGULAR PURPOSE FILES *(typified at left)* in all types, sizes and cuts.

SPECIAL PURPOSE FILES *(as at right)* for Aluminum, Brass, Lead and Babbitt, Die and Foundry Castings, Stainless Steel, Lathe Filing, etc.

NICHOLSON FILE COMPANY

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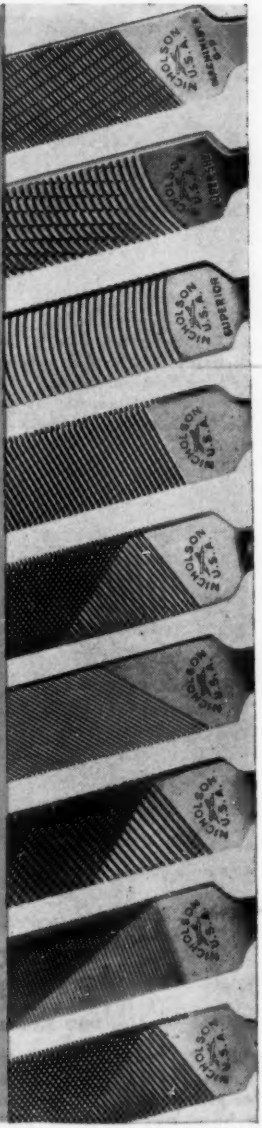
(In Canada, Nicholson File Company of Canada Ltd., Port Hope, Ont.)



NICHOLSON FILES *FOR EVERY PURPOSE*

SPECIALLY ENGINEERED

for today's high-speed finishing methods

LIGHT—HIGH POWERED

New No. 870 Sander

Weighing only 7½ lbs. — yet with full 5.5 ampere rating and designed for continuous production use — this beautifully engineered 7" sander sets new standards in its field. No load speed is 4500 r.p.m., making the No. 870 perfect for use with the new laminated phenolic wheels and discs. In every way, this new Millers Falls No. 870 is an outstanding performer for fast sanding, wire brushing, grinding and polishing.

FASTER— MORE POWERFUL

New No. 270 Polisher

Greater power (5 amperes) and a higher speed (1900 r.p.m.) make this newly designed 7" unit ideal for use with the latest-type cleaners and polishes which have recently found such favor. Light and compact, it handles beautifully and gets at the less accessible surfaces. It's supplied with a deep carpet-pile wool pad, the most effective polishing head ever developed. The new No. 270 is also highly efficient for rubbing, sanding and grinding.

Free On Request

Complete data on Millers Falls broad line of high performance electric tools for production and maintenance. Millers Falls Company, Greenfield, Mass.

FOR HEAVY SERVICE—

No. 900 Sander

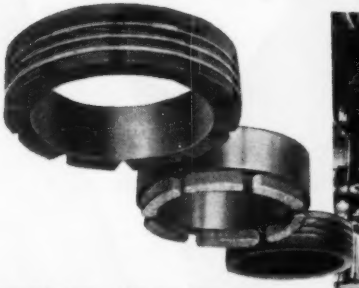
With 8.0 ampere rating, this powerful 7" sander has long been a favorite in hundreds of shops. Regularly equipped with flexible rubber and Co-ro-lite pads for sanding, it also offers exceptional, smooth-running performance with cup grinding wheels and wire cup brushes for a wide variety of finishing operations.

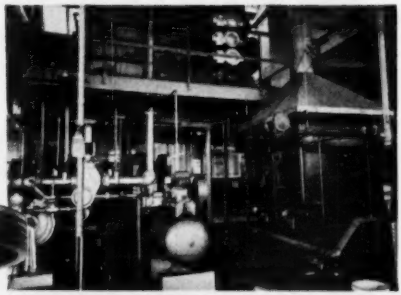
MILLERS FALLS TOOLS

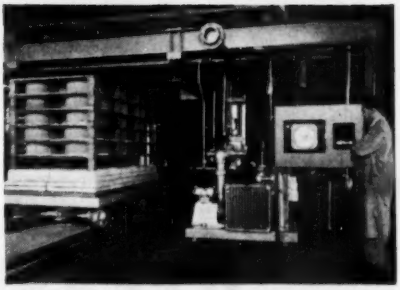
SINCE 1868 ®

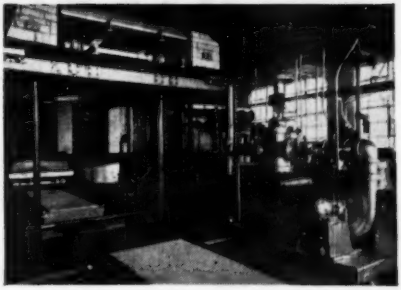
The Mark of Superiority

From the NEW Blanchard Wheel Shop









VITRIFIED WHEELS

For more than 25 years, Blanchard has directed its efforts toward developing the best grinding wheels for Blanchard Surface Grinders. It began by pioneering with silicate bonded wheels, and then resin bonded wheels. Now, from a new, ultra modern Blanchard wheel shop come *vitrified wheels* ... scientifically batched, pressed and fired ... with positive control of time and temperature.

Today, Blanchard offers complete wheel service ... silicate, resin and vitrified!

Use Blanchard wheels on your Blanchard Surface Grinder. They do a better job in less time, with less trouble and cost ... whether your work is tough as copper or fragile as glass ... whether it requires heavy roughing cuts or clean-up cuts with flatness to .000005" and finish of 1 micro-inch.

for Better Blanchard Grinding

PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE CO.

64 STATE ST., CAMBRIDGE 39, MASS., U. S. A.

COUPON

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COMPANY_____

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TRY Glenzer

UTILITY SLEEVES

They provide a REMOVABLE taper shank for straight shank drills, taps, countersinks reamers and other small tools. First introduced in 1919, more and more plants now specify them as standard. All the speed and convenience of taper shank tools, but instead of throwing away the entire worn out or broken taper shank tool, you retain the Utility Sleeve for use with dozens of straight shank tools.

Are You Using Them Everywhere You Should?

Customers report 40 to 75% savings in small tool costs after using these Sleeves. With rising labor and material costs, can you afford to overlook any further places to use them?

All Standard Tapers Supplied—Any Stock Size Sent on 30 Day Free Trial For Your Inspection and Work Out

THE J. C. GLENZER CO. Inc.

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Made of tough alloy steel, this specially designed tooth with a hook actually holds a keen cutting edge far longer, gives better service all along the line.

You'll find a Simonds Sabre Tooth does *more work* at *lower cost* than your present blade. Try it on your next job and see how it can cut your blade and production costs. All standard sizes in coils or welded-to-length are now available from your Industrial Supply Distributor's stock.

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SAW AND STEEL CO.
FITCHBURG, MASS.

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Canadian Factory in Montreal, Que., Simonds Division: Simonds Steel Mill, Lockport, N. Y.
Simonds Abrasive Co., Phila., Pa., and Arvida, Que., Canada

INCREASES PRODUCTION...

LOWERS COSTS...

PAYS FOR ITSELF QUICKLY...

The ROUSE HAND MILLER is a widely used, inexpensive, high speed, ball bearing, motor driven machine for handling light cuts in brass, aluminum, steel, plastics, and other materials—fast, accurately, and at very low cost. Only $110.00 Fixtures (illustrated) extra.*

*Motor equipment:—1/4H.P. 110 Volt AC 60 cycle, single phase, swivel motor mount and light—$36.00**

**All prices FOB Chicago.*

- ★ **MILLS SMALL PARTS MUCH FASTER.**
- ★ **DRASTICALLY CUTS YOUR INVESTMENT IN EQUIPMENT.** Replaces expensive production machinery—or releases it for other jobs.
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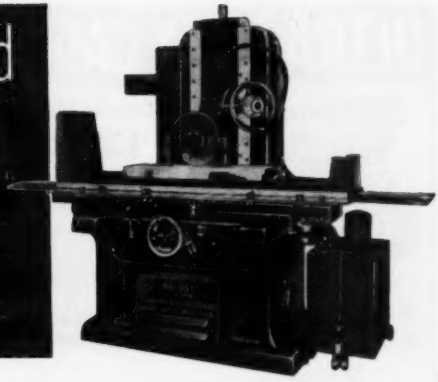

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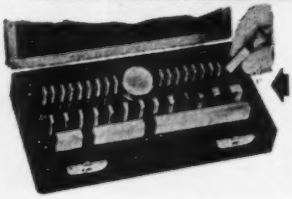

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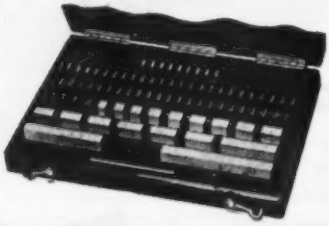

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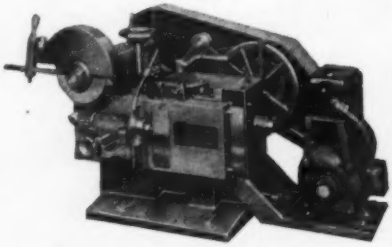

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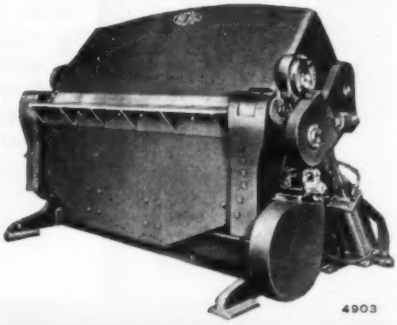

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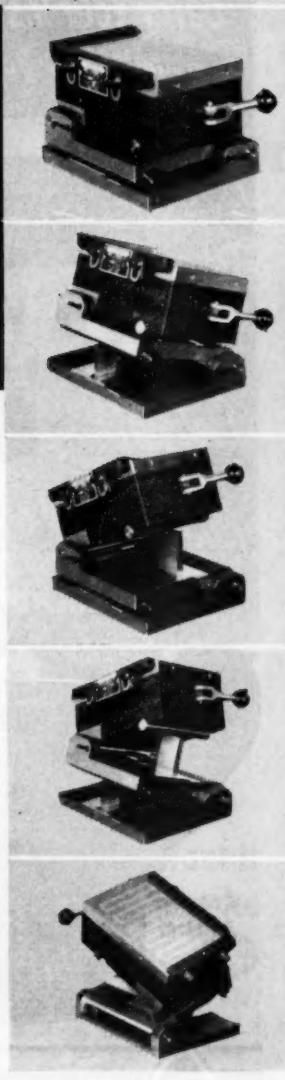

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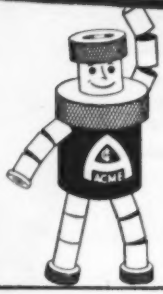

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13 Key Moore Tools help put the PRECISION in Harig Dies

KARL HARIG

"When owner-management invests its money in machinery," says Karl Harig, founder and president of Harig Manufacturing Corporation, "it does so only after a thorough analysis and careful selection of available equipment." So it's significant that Harig, one of America's foremost producers of carbide, lamination, progressive, stamping and other types of precision dies, employs 13 Moore precision-built machine tools for many of its most critical toolroom operations.

A trip through Harig's modern Chicago plant reveals:

3 MOORE JIG BORERS, for accurate locating and boring of holes in a fraction of the time required by other means;

6 MOORE JIG GRINDERS, for relocating and grinding of holes and contours—within tenths—after hardening;

3 MOORE PANTO-CRUSH WHEEL DRESSERS, for speedy, cost-cutting performance of both crush-forming and diamond-dressing on the wheel spindle of a surface grinder;

1 MOORE DIE FLIPPER, for "mechanized" die tryouts and assembly.

The combination of Harig craftsmanship and Moore precision tools has been an important factor in Harig's successful effort to meet continuing demands for faster production of intricate dies, tools, jigs, fixtures and gauges.

Why not discover how Moore tools can bring more speed and greater accuracy to *your* toolroom. Write today for our detailed literature.

Moore Special Tool Company, Inc.
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A battery of six Moore Jig Grinders performs precision internal and contour grinding operations on sectional die parts at the Harig plant.

Three rugged Moore Jig Borers handle the bulk of Harig's critical spotting, drilling, boring and reaming operations.

Harig uses this Moore Panto-Crush Wheel Dresser on a surface grinder for fast pantograph profile grinding. Harig also has two more of these cost-cutting units.

A Moore Die Flipper facilitates accurate die tryouts and assembly at Harig, replaces time-consuming hand-labor methods.

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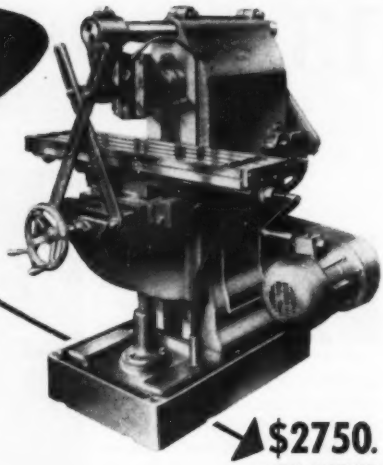
The Bradley MILLER for ECONOMY



Looking for a well built miller, designed for long life and precision work at a low price? Look no further . . . as the Bradley Miller has all these qualities. Equipped with a vertical head and slotting attachment. Working table surface area is 46" x 10". Automatic feed longitudinal, 36½". 10" vertical adjustment. Weighs 3,000 lbs. and occupies a 70" x 60" floor space. Further details mailed on request. Write today. No obligation.

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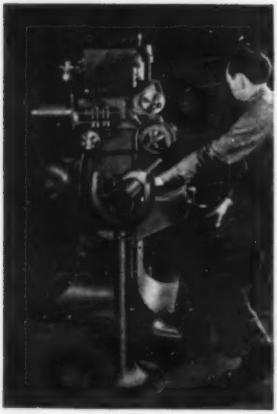

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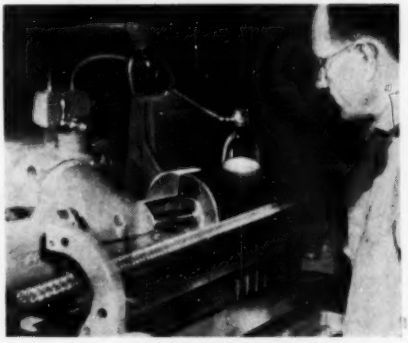

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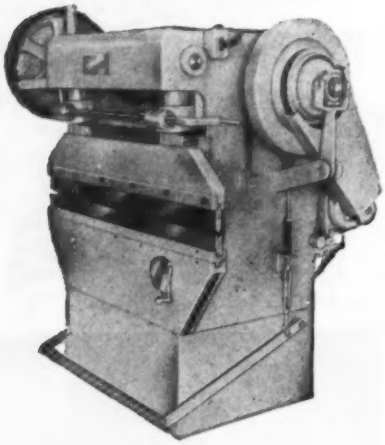

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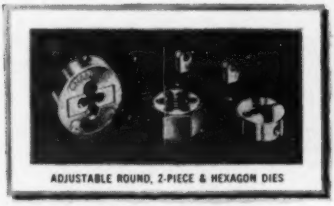

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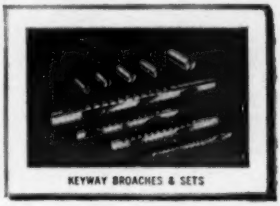

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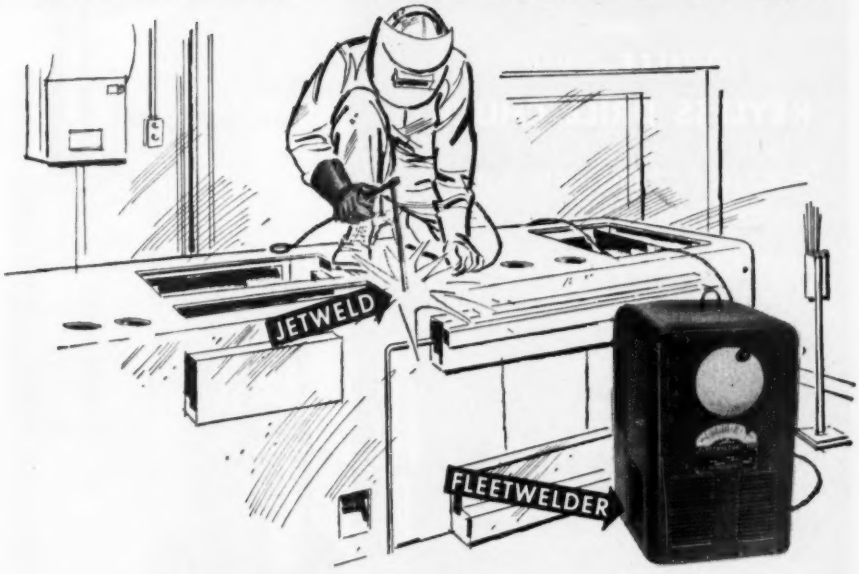

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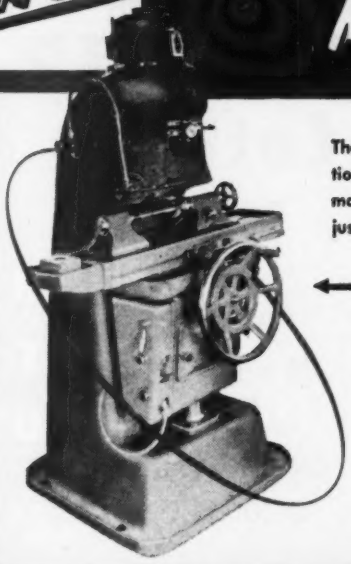
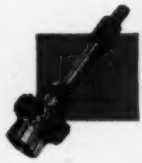
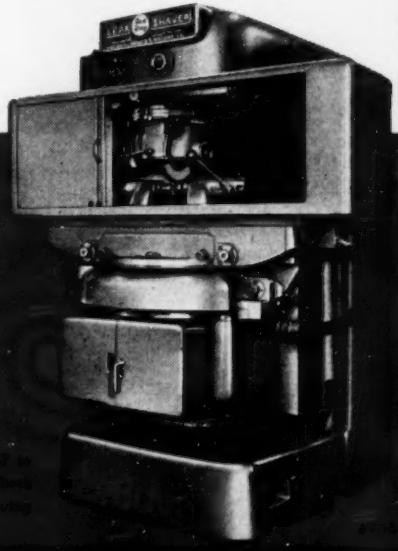


The one sure way of meeting today's competition is with today's machine tools. The older machines were all right in their day but they just haven't got what it takes now.

← **For instance,** it took this old Red Ring Model GCC 60 seconds to shave a gear like the one shown. →





Model GCU today finishes that same gear in just 16 seconds—and to much closer tolerances, too.

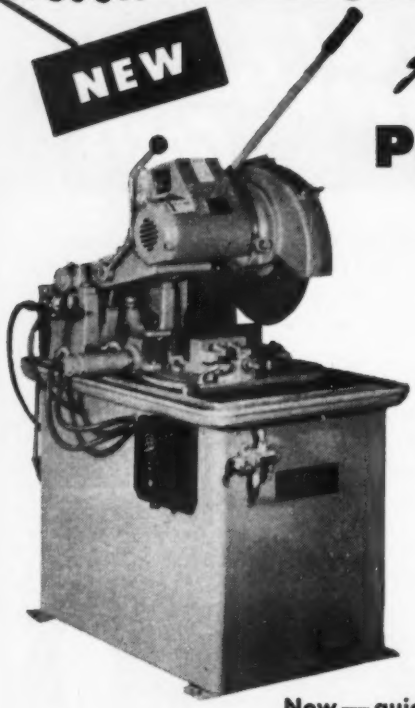
In an 8 hour day the GCU will deliver 375% of the production of its predecessor.

NATIONAL BROACH & MACHINE CO.

5600 ST. JEAN . . . . . DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

NEW



Automatic
POWER-FED
Cutting Head
for STONE Model M-75

ONE SIMPLE LEVER FOR AUTOMATIC CUTTING

You Save up to 25% on wheel costs with power feed!

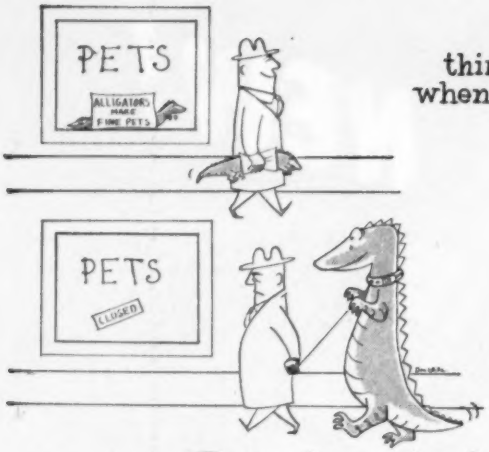
Now — quicker — safer — cutting with controlled feeds, gives even greater efficiency to Stone High-Speed cutting equipment. The automatic feed improves the quality of cut, eliminates operator fatigue, increases production rates and increases wheel life.

AVAILABLE AS OPTIONAL EQUIPMENT ON NEW MACHINES OR AS SEPARATE UNIT FOR INSTALLATION ON PRESENT MACHINES.

Write Today For Complete Information

STONE MACHINERY CO., INC.
Fayette St. Manlius, N. Y.

NEW!
THE
MODERN
TYPE M
STUD SETTER*
A Better Stud Setter
for
Better Stud Setting!
*Details on Request
MODERN TOOL WORKS
DIVISION
CONSOLIDATED MACHINE TOOL CORPORATION
WHOLLY OWNED SUBSIDIARY OF FARREL-BIRMINGHAM COMPANY, INCORPORATED
ROCHESTER, NEW YORK



things to watch for
when buying alligators . . .

But if you're buying special purpose STEELS, may we recommend the **SPEED STEELS**

SPEED CASE — a low carbon free machining open hearth steel

SPEED TREAT — a medium carbon free machining open hearth steel

SPEED ALLOY — a chromium alloy steel

briefly they

- **are easy to heat-treat**
- **are fast machining**
- **give longer tool life**
- **produce better finishes**

THERE ARE SPEED STEEL SPECIALISTS IN . .

Akron, Ohio	Burger Iron Co.
Bridgeport, Conn.	Bridgeport Steel Co.
Buffalo, N. Y.	Beals, McCarthy & Rogers
Cambridge (Boston), Mass.	Brown Wales Co.
Chicago, Ill.	W. J. Holliday & Co., Inc.
Dallas, Tex.	Earle M. Jorgensen Co.
Detroit, Mich.	Peninsular Steel Co.
Hammond, Ind.	W. J. Holliday & Co., Inc.
Houston, Tex.	Earle M. Jorgensen Co.
Indianapolis, Ind.	W. J. Holliday & Co., Inc.
Lewistown, Me.	Brown Wales Co.
Los Angeles, Calif.	Earle M. Jorgensen Co.
Memphis, Tenn.	Pidgeon-Thomas Iron Co.
Newark (New York), N.J.	Grammer, Dempsey & Hudson, Inc.
Oakland (San Francisco), Calif.	Earle M. Jorgensen Co.
Philadelphia, Pa.	Horace T. Potts Co.
Toronto, Ontario	Peckover's, Ltd.
Tulsa, Okla.	Earle M. Jorgensen Co.

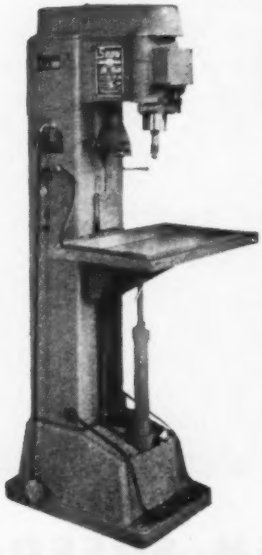
W. J. Holliday & Co., Inc.

141 141st STREET · HAMMOND, INDIANA

Speed steels are produced by W. J. Holliday & Co., Inc., Speed Steel Plate Division

SNOW MANUFACTURING COMPANY

455 EASTERN AVENUE • BELLWOOD, ILLINOIS



FULL UNIVERSAL
MACHINES
Electrically Operated—Air Controlled

. . . *Drilling*—TYPE "UD"

Capacities from #60 through ⅜" in two sizes

. . . *Tapping*—TYPE "UT"

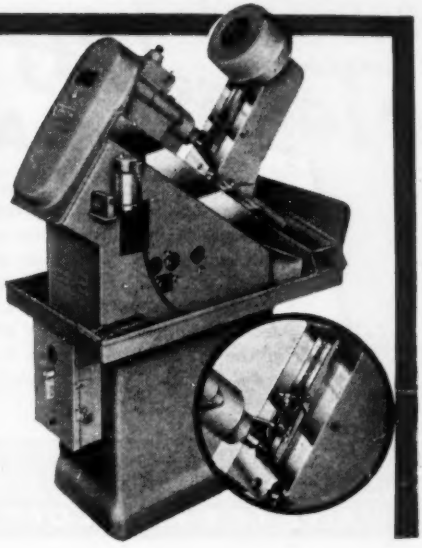
Capacities from #0 through ¾" in four sizes

. . . *Threading*—TYPE "TR"

Capacities up to 1" in two sizes

AUTOMATIC and SEMI-AUTOMATIC
JIGS and FIXTURES
for Indexing and Clamping

A complete line of basic Master Fixtures to permit adaptation of a wide range of parts at high production rate with low tooling cost.



FULL AUTOMATIC
Nut Tapping Machines

Completely automatic hopper feed nut tapping machines up to ½"—incorporating simplicity and low tooling cost. Standard taps are used. Precision class 3 and 4 fits and parallelism maintained at high speed and high production.

NOTHING COMPARES WITH IT FOR TRIMMING FORMED PARTS!

FRICTION SAWING *with*

Tannewitz HIGH SPEED BAND SAWS

Tremendous savings of time and money are effected in trimming formed parts with Tannewitz High Speed Band Saws, for not only are the cuts made fast and smoothly, but in most cases no jigs or rests of any kind are required. Sheets of both soft and hard steel, non-ferrous metals and many other materials are also handled to great advantage by this method and it is perfect for trimming castings. By all means get the complete facts and learn of the many opportunities for boosting production and lowering costs that Friction Sawing with Tannewitz High Speed Band Saws offers.

The TANNEWITZ WORKS GRAND RAPIDS MICHIGAN

WRITE FOR FREE COPY OF FRICTION SAWING

Wilson "Rockwell"* Hardness Testers

SET-O-MATIC* DIAL GAUGE

● Eliminates human error. Operator merely applies minor load and taps depressor bar. No setting of dial to zero.

OTHER FEATURES

- **Major load applied under dash pot control**
- **Major load removed by motor**
- **Illuminated Dial Gauge**
- **Illuminated Penetrator**

Eliminates Operations... Increases Tests per Hour

All you have to do with the Model Y WILSON "ROCKWELL" Motorized Hardness Tester is apply the minor load and tap the major load depressor bar. The machine does everything else automatically. The cycle of Major Load operation may be less than 2 seconds.

This speed of test means great savings in time which will reduce your hardness testing costs. Yet it is done to Wilson's high standard of accuracy.

The Model Y Motorized WILSON "ROCKWELL" Hardness Tester is in production and orders are being accepted for early delivery. Write today for literature and prices.

*Trade Marks

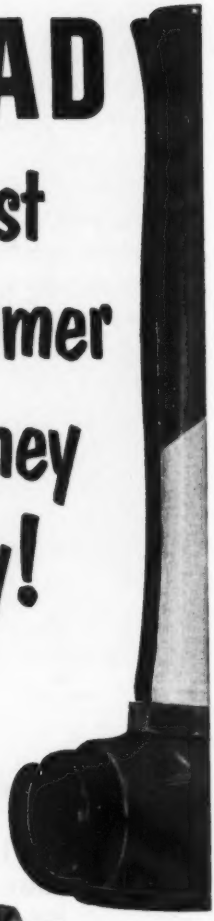
ACCO

Wilson Mechanical Instrument Division
AMERICAN CHAIN & CABLE

230-T Park Avenue, New York 17, N. Y.

C/R JAW-HEAD

The best "soft" hammer your money can buy!



Tough, resilient water buffalo faces deliver plenty of power with full protection for delicate parts and finishes. Faces are easily replaced, and comfortable Safety-Flare handle gives you non-slip grip. Work goes better with a C/R RAWHIDE Jaw-Head. See for yourself.

- ***Available from leading industrial suppliers. Also C/R Rawhide mallets and Rawhide mauls. For further information write Dept. 22***

CHANGE FACES IN SECONDS

CHICAGO Rawhide MFG.CO.

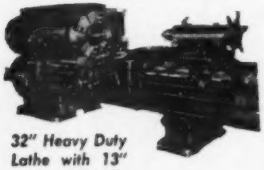
1301 Elston Ave. Chicago 22, Illinois

In Canada: Super Oil Seal Mfg. Co., Ltd., Hamilton, Ontario

The First Lehmann HYDRATROL Lathe Ever Sold is Still Going Strong!

18 Years of Grueling Service for Lathe #5155

Here is dramatic proof of the durability and rugged dependability of Lehmann HYDRATROL Lathes! The first Lehmann HYDRATROL, sold over 18 years ago, is still operating every day. The present owner of this Lathe, A. J. Flowers of the W. L. Flowers Machine and Welding Co., Alice, Texas, recently wrote us: "We are happy to say we are still operating the Lehmann Lathe Serial No. 5155. We have averaged operating the lathe sixteen hours each day. It is giving excellent service."



32" Heavy Duty Lathe with 13" Hole in Spindle

FIVE SIZES—18" to 36"

Small . . . . 18" up to 7⅛" **Hole**
Medium . . . 25" up to 12" **Hole**
Large . . . . 32" up to 13" **Hole**
Large . . . . 36" up to 16⅛" **Hole**
(Standard type lathes, 16" to 36")

Remember these important HYDRATROL features:

• 16 spindle speed changes with only a "Twist of the Wrist" • Automatic slide rule co-ordinated with movement of handle shows spindle revolutions per minute and indicates cutting speeds in feet per minute • 16 forward and 8 reverse speeds • No need for intermediate stop; unnecessary to disengage the friction driving clutch to change speed • Hydraulic friction clutches and hydraulic brakes, self compensating • Automatic safety relay for harmless and easy engagement of positive clutches when speeds are changed • Spindle release for chucking • Safety-control lubrication with filtered oil • Gears constantly in mesh • Safe in operation • Simple construction and operation.

For Catalog, additional information or recommendation write:

LEHMANN MACHINE COMPANY
GRAND at CHOUTEAU • ST. LOUIS 3, MO.

DIVISION OF NOVO ENGINE CO.

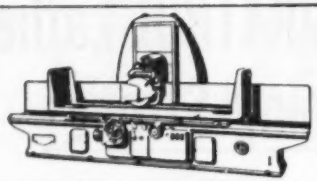
MATTISON GRINDERS

If its a Flat Surface to Grind
There's a Mattison to Grind it

• Mattison now is in a position to work with you on all your surface, face and disc grinding problems. These machines are made in various types to handle a wide range of work. Experienced fixture engineers are available to give you best production efficiency with Mattison Machines.

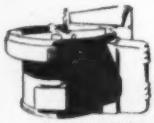
For any flat grinding, ask for our recommendations on the proper method and machine for your job. No obligation, of course.

For catalog on all machines, ask for free copy of general bulletin.



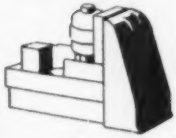
Precision Surface Grinders Horizontal Spindle

Disc Grinders, Double Spindle Type

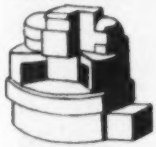


Vertical Spindle Disc Grinders

Plane Grinders, Rotary Table Type



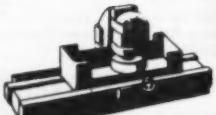
Rotary Table Surface Grinders



Automatic Rotary Surface Grinders

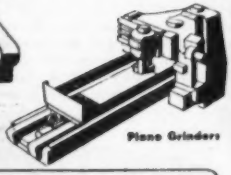
Reciprocating Table Face Grinders

Disc Grinders, Single Spindle Type



Reciprocating Table Surface Grinders Vertical Spindle

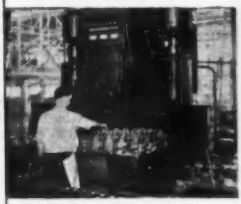
Face Grinders, Traveling Wheel



Plane Grinders

40 hours before — now 4 hours. Pump case ground on Mattison Horizontal Spindle Precision Surface Grinder

230 surfaces of cast iron compression heads per hour, removing 1/32" stock with Mattison No. 24 Rotary Surface Grinder

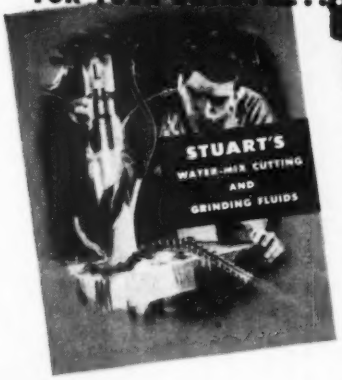


900 connecting rods per hour, using 40 station Rotary to finish grind crank and wrist pin end of assembled rod with Mattison No. 72 Grinder

Shows variety of work run on Mattison Face Grinders

MATTISON MACHINE WORKS
ROCKFORD · ILLINOIS

FOR YOUR BARBEQUE . . . .



a *NEW GUIDE* to SOLUBLE OIL SELECTION

Every industrial lubricant is measured by its performance. Water-mix cutting and grinding fluids are no exception . . . it still takes the *right* oil to do the *best* job!

Stuart Oil Company's guide on water-mix cutting and grinding fluids is intended as a help when you're selecting a water-mix for the shop. It provides information and background on water-mixtures that you should know.

"The Man in the Barrel," your Stuart Representative, will be pleased to provide further information and help. Send for your book today.

DASCO

Two water-mixes built into one. Dasco Super Soluble Base is a heavy-duty water-mix cutting and grinding fluid of unusual versatility. Superior performance is provided in mixtures of 1-40 and higher for turning, milling, reaming, drilling and boring and 1-100 and higher for grinding.

KLEENKUT

A *conventional* type soluble oil to perform such jobs as light milling, turning, drilling, boring and others. Kleenkut provides something *extra* with more uniform performance, better stability, detergency, emulsibility and high anti-rust value.

SOLVOL

An emulsified heavy-duty cutting oil that is especially effective on the more severe applications where ordinary type soluble oils fall short of meeting tool life and finish requirements. Solvol provides a balance of cooling and lubricating value rarely equaled in a water-mix product.

CODOL

Stuart's water-mix liquid grinding compound that has been specially designed to reduce wheel loading. It provides adequate heat dissipation, anti-rust protection and a carefully balanced surface tension to carry away chips and abrasive particles.

More than a "Coolant" Is Needed

D. A. Stuart Oil Co.
EST. 1865 LIMITED

TIME-TESTED CUTTING FLUIDS AND LUBRICANTS

2749 S. Troy St., Chicago 23, Illinois

In Canada: Canadian D. A. Stuart Oil Co., Ltd.
3575 Danforth Ave., Toronto

CLIP TO YOUR COMPANY LETTERHEAD AND MAIL TO

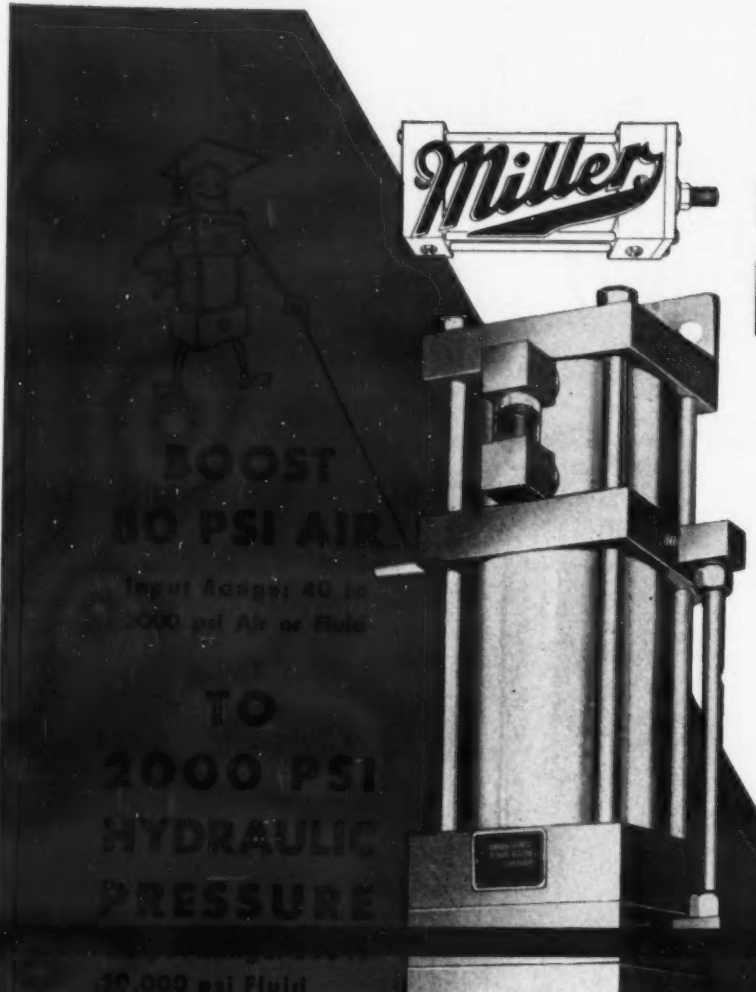
D. A. Stuart Oil Company
2749 S. Troy St., Chicago 23, Ill.

Please send me a copy of Stuart's Water-Mix Cutting and Grinding Fluids book.

Name .....

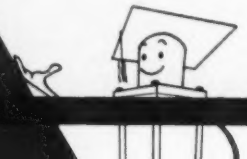
Title .....

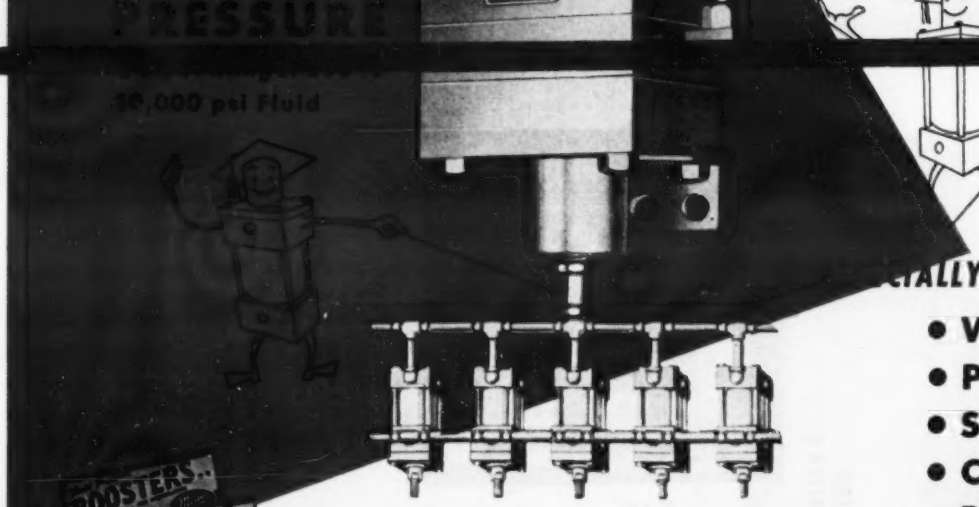
☐ Please have "the Man in the Barrel" call.



FLUID PRESSURE
BOOSTERS

- Save space, weight and investment cost by replacing pump installations in many applications
- Less costly to install, operate and maintain
- **Hold pressure indefinitely** without the motion and heat generation of ordinary pump circuits
- Provide—at point of cylinder thrust—more efficient power with less weight in less space than direct driven air cylinders
- Save up to 95% of air consumed by direct driven air cylinders
- Operate at speeds of 30 to 450 strokes per minute





FULL DETAILS IN MILLER BULLETIN B-200 SENT FREE ON REQUEST
Other Miller products include: Air cylinders, 1½" to 20" Bores, 200 PSI operation; low pressure hydraulic cylinders, 1½" to 6" bores for 500 PSI operation, 8" to 14" bores for 250 PSI; high pressure hydraulic cylinders, 1½" to 12" bores, 2000-3000 PSI operation. All mounting styles available.

CIALLY RECOMMENDED FOR

- **WELDING**
- **PUNCHING**
- **SHEARING**
- **CLAMPING**
- **RIVETING**
- **CRIMPING**
- **PRESSING**

and similar applications

SALES AND SERVICE FROM COAST TO COAST

CLEVELAND • YOUNGSTOWN • DAYTON • PITTSBURGH • PHILADELPHIA • BOSTON • HARTFORD • NEW YORK CITY • BUFFALO • ST. PAUL • GRAND RAPIDS • DETROIT • FLINT • FORT WAYNE • SOUTH BEND • INDIANAPOLIS • MILWAUKEE • LOUISVILLE • KANSAS CITY • SEATTLE • LOS ANGELES • SAN FRANCISCO • BALTIMORE • DENVER • ST. LOUIS • MOLINE • CHICAGO • HOUSTON • TORONTO, CANADA and OTHER AREAS

Miller

2026 N. Hawthorne Ave., Melrose Park, Ill.

what's so different about

Piercing Color TV Chassis?

Color TV chassis are produced in small lots—require frequent engineering changes—setups and production tools are high cost operations.

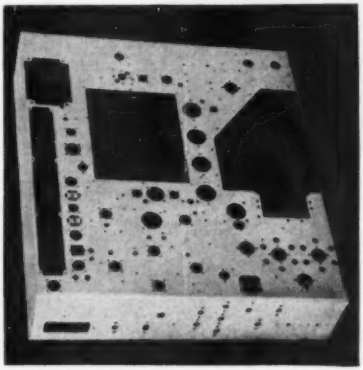
THE WIEDEMANN RA-41P TURRET PUNCH PRESS economically produces chassis and panels in small lots for

COLOR TV
RADAR
FIRE CONTROL
COMMUNICATIONS
BUSINESS MACHINES
AIRCRAFT

and many other applications

because:

- **Setup time is low**
- **Initial tooling cost is low**
- **Punches and dies are re-used on other jobs so tooling cost soon becomes a negligible factor**
- **Engineering changes are accomplished without delay to production schedules and at low cost**
- **Complete flexibility—close hole centers—20 hole sizes in sheets to 28" x 40" in single handling—40 to 60 holes per minute located to plus or minus .005" tolerance**



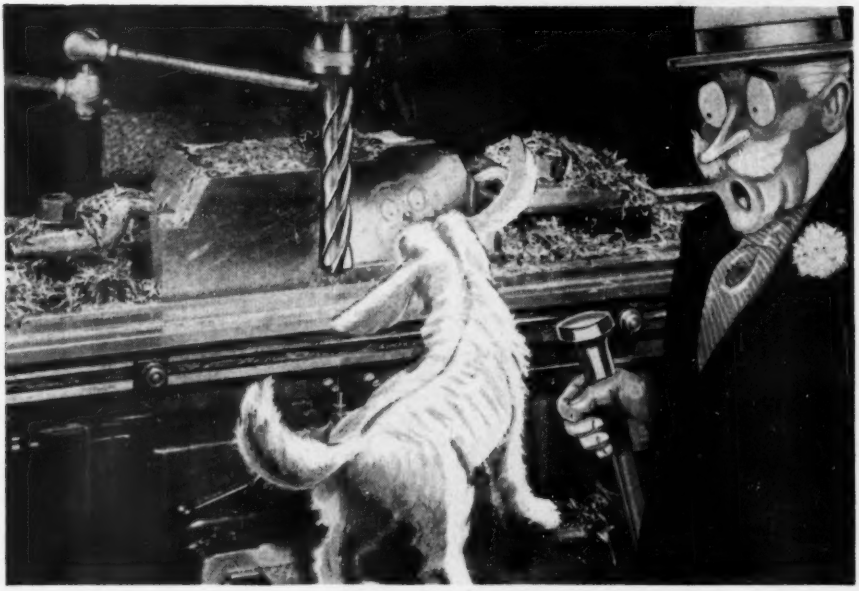
COLOR TV BASE
Quantity 55
(Pierced on Wiedemann RA-41P)
530 strokes of press
31 different punches and dies used
(no special tools)
2 handling operations
TOTAL TIME (floor to floor)
per piece 16.25 MINUTES

These advantages combine to make the RA-41P Wiedemann Turret punch press a paying investment to all chassis fabricators, since the RA-41P is the only machine designed for economically piercing electronic chassis and panels in low runs.

WRITE FOR A COPY OF BULLETIN 241

WIEDEMANN MACHINE COMPANY

4265 Wissahickon Avenue, Philadelphia 32, Pa.



PUTNAM END MILLS

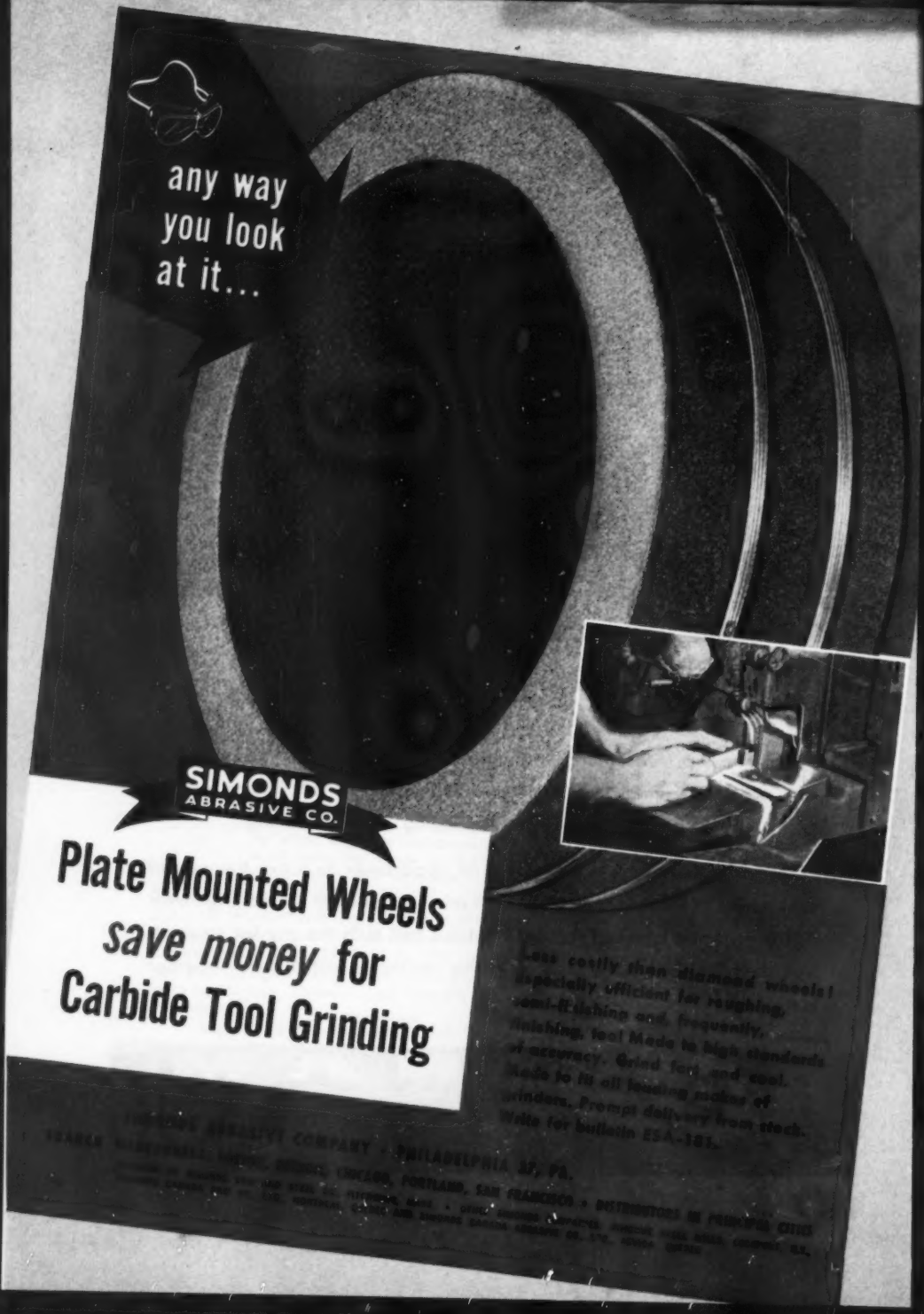
Produce Finer Finishes

Noted For Fast Free Cutting on toughest metals at heavy feeds and high speeds, Putnam End Mills produce smooth accurate cuts having exceptional finishes that often eliminate all grinding or hand finishing.

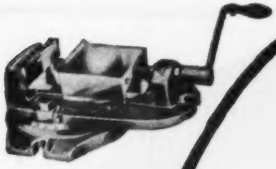
Your toughest milling operation is an opportunity to prove the unusual superiority of Putnam End Mill design and manufacture. Select from over 1200 sizes and types of standard Putnam End Mills the one for your job and then watch it more than meet the challenge with faster, smoother cutting.

PUTNAM

2981 CHARLEVOIX AVENUE • DETROIT 7 MICHIGAN


any way
you look
at it...
SIMONDS
ABRASIVE CO.
Plate Mounted Wheels
save money for
Carbide Tool Grinding

MILLING MACHINE VISE



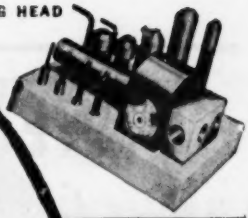
An improved vise of greater gripping power. Streamlined for appearance; rigid holding by means of large diameter screw; coolant trough. Two sizes: 5"x3½" and 6"x5" jaw openings.

★

RIGHT ANGLE ATTACHMENT HEAVY DUTY

Designed for Milling and drilling at right angles; available for Master and 1 HP Bridgeport Heads.

No. 2 BORING HEAD



Boring Tools and Holder provide means for boring holes up to 6" diameter. Available for use on Bridgeport 1 HP milling, Drilling and Boring Attachment.

★

RIGHT ANGLE ATTACHMENT LIGHT DUTY

For right angle milling and drilling narrow, deep molds and cavities.

Defer obsolescence for many years to come . . . with

Bridgeport

TURRET MILLING MACHINES

Shops both large and small, by replacing old, inefficient machines with modern "BRIDGEPORT MILLERS" find prompt returns on their investment. Moderately priced, versatile, accurate "BRIDGEPORTS" put obsolescence far off into the distant future because they are away ahead of their time in convenience, long-lived economy and outstanding utility.

These universally-accepted machines are kept constantly busy production-wise through their **exclusive method** of milling, drilling, boring, and shaping, combined with ability to position the milling head at all angles over a wide area **without changing set up.** Attachments are available (some of which are shown here) extending the utility of these machines of unprecedented popularity.

Ask your dealer . . . or us . . . to show how the Bridgeport Turret Milling Machine will defer obsolescence in your shop.

Bridgeport MACHINES, INC.

Bridgeport, Connecticut

Manufacturers of High Speed Milling Attachments and Turret Milling Machines

If WEAR is a factor...

...use

VK CARBIDE PLUG GAGES

TUNGSTEN CARBIDE
wire type .016" to .500" diameter
CHROME CARBIDE
taper insert type .500" to 1.510" diameter

In addition to its regular line of tungsten carbide wire type plug gages from .016" to .500" in diameter, The Van Keuren Company now offers a new line of chrome carbide taper insert plug gages in the range from .500" to 1.510" diameter.

Van Keuren tungsten carbide wire type gages have proved their worth on thousands of tough gaging jobs. The new chrome carbide taper inserts (Carboloy, grade No. 608*) promise to be equally effective. Wearing qualities of chrome carbide are comparable with tungsten carbide. In addition, the material is lighter than tungsten carbide and has a coefficient of expansion close to that of steel . . . both of which factors are a distinct advantage in the larger sizes.

Finish on Van Keuren gages in either tungsten carbide or chrome carbide will average .5 RMS or better. These gages are available in Class Y, X and XX accuracies at moderate prices and on a reasonable delivery basis.

*Trademark of the Carboloy Dept. of General Electric Company.

Send for a copy of the 220-page Van Keuren Catalog and Handbook No. 35 containing valuable technical and engineering information on measuring problems and methods. Address: The Van Keuren Co., 177 Waltham St., Watertown, Mass.

VK
35th YEAR

THE Van Keuren CO.,

177 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires • Chrome Carbide Taper Insert Plug Gages

The sweetest story ever told – on AIR and HYDRAULIC POWER!

Hydraulic Cylinder Catalog 106 — Cushioned and non-cushioned, standard rod and 2:1 rod, single and double end rod, internal and external threads, all standard mountings in 2" to 10" bores. Offered for 1500 P.S.I., 3000 P.S.I.

Hydraulic Valve Catalog 204 — 4-way, 3-way, pilot, and remote valves in 6 operations, 4 actions, 7 sizes, 5 piston designs. Offered for 1500 P.S.I., 3000 P.S.I.

These five books, totaling 68 pages, are jam-packed with all the data necessary to lay out successful air and hydraulic circuits. 450 Rivett models, in a variety of sizes, are detailed—every standard air and hydraulic component offered in the industry. Description of each includes working drawings, specifications, and cut-away views. Easy to use, complete in information, these Rivett catalogs are a must on every board. Write to Rivett Lathe & Grinder, Inc., Brighton 35, Boston, Massachusetts.

450 standard Rivett models described!

— All the necessary components for any efficient circuit.

Hydraulic Power Unit Catalog 400 — Single, double and combination pump types. Single — .4 G.P.M. to 40 G. P. M. at 1000 P.S.I. Double—3.5 G.P.M. to 48 G.P.M. at 1000 P.S.I.

Air Cylinder Catalog 55 — Cushioned and non-cushioned, single and double end rods, internal and external threads, 7 mountings in 1½" to 12" bores. Offered for 150 P.S.I. air and 300 P.S.I. oil services.

Air Valve Catalog 303 — 4-way and 3-way, pilot and remote valves in 5 operations, 5 sizes. Offered for 150 P.S.I. service.

Rivett Lathe & Grinder, Inc., Dept. MTB-9 Brighton 35, Boston, Mass. Please send me: ☐ Hydraulic Cylinder Catalog 106 ☐ Hydraulic Valve Catalog 204 ☐ Hydraulic Power Unit Catalog 400 ☐ Air Cylinder Catalog 55 ☐ Air Valve Catalog 303

Name_____ Company_____

Address_____ City_____ State_____

RIVETT furnishes a complete power package

VALVES • CYLINDERS • POWER UNITS

Now! Greater than Ever FACILITIES

TO MEET YOUR ASSEMBLING REQUIREMENTS!

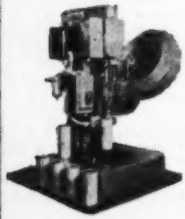
- POWER SCREWDRIVERS
- SELECTIVE PARTS FEEDERS
- SPECIAL ASSEMBLING MACHINES
- EXTENDED ENGINEERING SERVICE

POWER SCREWDRIVER

BARREL FEEDER

BOWL FEEDER

● *Action . . . More Action* . . . in your assembly department! *More Speed . . . Greater Accuracy . . . Lower Costs* . . . Vital factors in your production program . . . Advantages available to you through the DPS expanded line and increased manufacturing facilities . . . Tell us your story . . . *Let our trained engineers analyze your problem* . . . Whatever your feeding and assembling operations may be, they will come up with a practical solution.



SPECIAL ASSEMBLING MACHINE

GIVE US THE DETAILS . . . SEND SAMPLE ASSEMBLY.

DETROIT POWER SCREWDRIVER CO.

2809 W. FORT ST. **DETROIT 16, MICHIGAN**

Levermatic
COLLET CHUCK

SPINDLE NOSE COLLET CHUCK

A New Standard for Positive Gripping. *Instant* internal and external gripping and releasing while machine is in constant operation, assuring continuous accuracy and uninterrupted production.

Faster . . . Lower Costs. Customers report big savings! One reveals his machine rates on production cut from 44½c to 22c per 100 pieces!

Used On Variety Of Machines—Lathes, Turret Lathes, Milling Machines, Grinders, Thread Grinders, Drill Presses, special production machines.

A PRODUCTION CHUCK FEATURING —

Highest Precision Accuracy
Full Spindle Capacity
Unequalled Gripping Power
No Heat or Friction
Full Bearing Collet
Simple Finger-Tip Adjustment
Quicker Collet and Arbor Changes
Faster Chucking

Write For New Catalog
Shows Levermatic construction, specifications and many standard and special applications.

Sutton Tool Company

DEPT. MTB9, STURGIS, MICHIGAN

in portable drills

YOUR BEST BUY IS BUCKEYE

360° EXHAUST DEFLECTOR

NOW—an exhaust deflector to satisfy every tool operator, can be positioned anywhere in full 360° circle.

✔ **PACKAGE VALVE**

NOW—all valve parts can be removed in one unit for inspection, cuts maintenance time and costs.

✔ **QUIETER OPERATION**

NOW—new design developments have improved the noise factor, make Buckeye air drills more quiet than ever.

✔ **MORE INTERCHANGEABLE PARTS.**

NOW—identical cylinders on all "A" Series drills, all handle types, permits smaller parts inventory.

✔ **PALM-FIT HANDLE**

NOW—a tool completely free from annoying projections and angles, fits the hand in an easy, natural grip.

NOW—five important improvements have been added to Buckeye air drills, now more than ever your best buy! These are the drills tool room foremen prefer and tool operators ask to use!

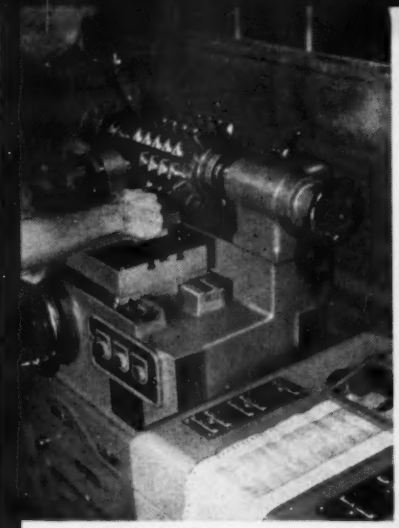
No Buckeye tools in your plant? Then select your air tools by comparison, not habit. We'll be glad to put a Buckeye tool on trial in your plant . . . just tell us where and when, we'll do the rest and let you compare. Naturally, there's no obligation.

Buckeye Tools
CORPORATION
DIVISION 14 • DAYTON 1, OHIO

producers of the world's first successful rotary air tools

This Month's

GEAR PIX



ACCURACY—Accuracy of the gear is directly related to the accuracy of the hob that generates the teeth of the gear. A Michigan Tool inspector is shown here checking and charting the accuracy of a large two-thread Michigan Process hob on the Michigan Sine-Line model 874 hob lead checker.

15 SHEAR-SPEEDS—Four of a battery of fifteen Michigan Shear-Speed gear shapers which cut a variety of slots or serrations on malleable planetary elements in a large automotive automatic transmission plant. All slots or serrations are cut simultaneously, in some cases two parts at a time, by the Shear-Speed gear shapers.

NEW 3-WAY GEAR SELECTOR automatically segregates 100% of gear production into undersize, oversize and OK gears as fast as they are cut or finished. Made in both gravity and conveyor types. May be attached to any gear cutting or gear finishing machine. Can be integrated with the machine cycle to automatically shut off the machine whenever a certain percentage of undersize or oversize gears are produced.

MICHIGAN TOOL COMPANY

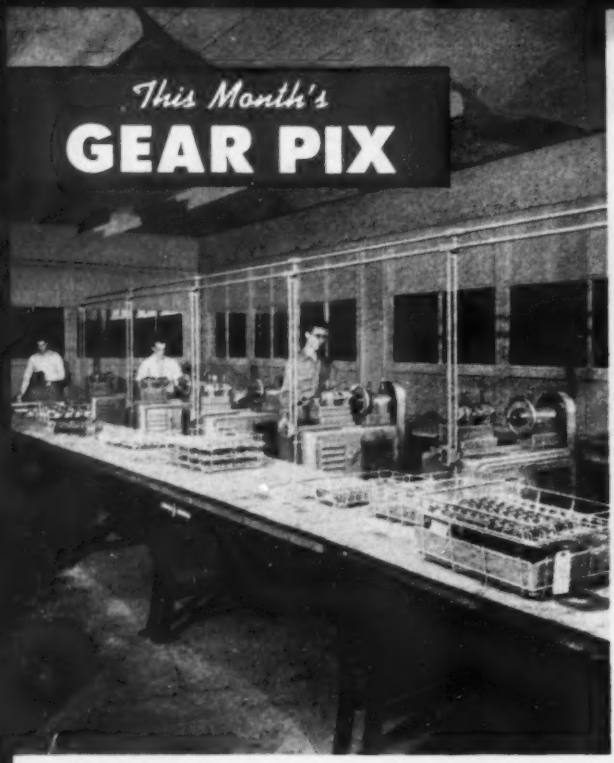
7171 E. McNICHOLS RD. • DETROIT 12, MICH.

IN CANADA: COLONIAL TOOL CO., LTD.

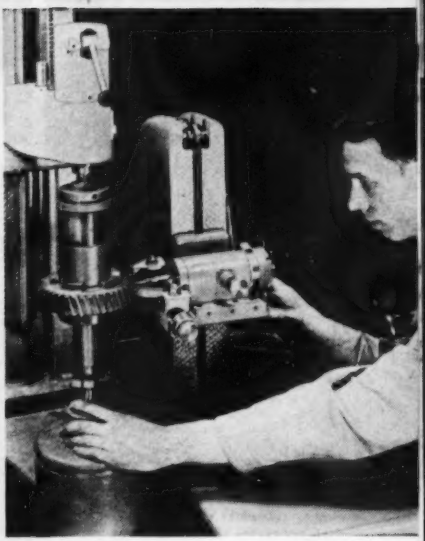
Over

This Month's

GEAR PIX



GEAR INSPECTION—One of the rows of Michigan model 1129 gear speeders used to inspect gears in a large automotive automatic transmission plant, prior to assembly. Gears are speeded in mesh under brake loads to check quietness and tooth contact.



INVOLUTE AND TOOTH SPACING—One of the leading lathe manufacturers uses this Michigan Sine-Line model 1124 involute and tooth spacing checker to inspect the involute contours and tooth spacing on the helical and spur gears that are used in their line of lathes.

AUTOMATIC LOADING & SIZING

More than four out of five of the standard Michigan 870 gear shavers now being built are equipped with automatic chute loading and automatic size checking. This speeds up the shaving cycle and permits one operator to handle up to three of these machines with ease.

MICHIGAN TOOL COMPANY

7171 E. McNICHOLS RD. — DETROIT 12, MICH.

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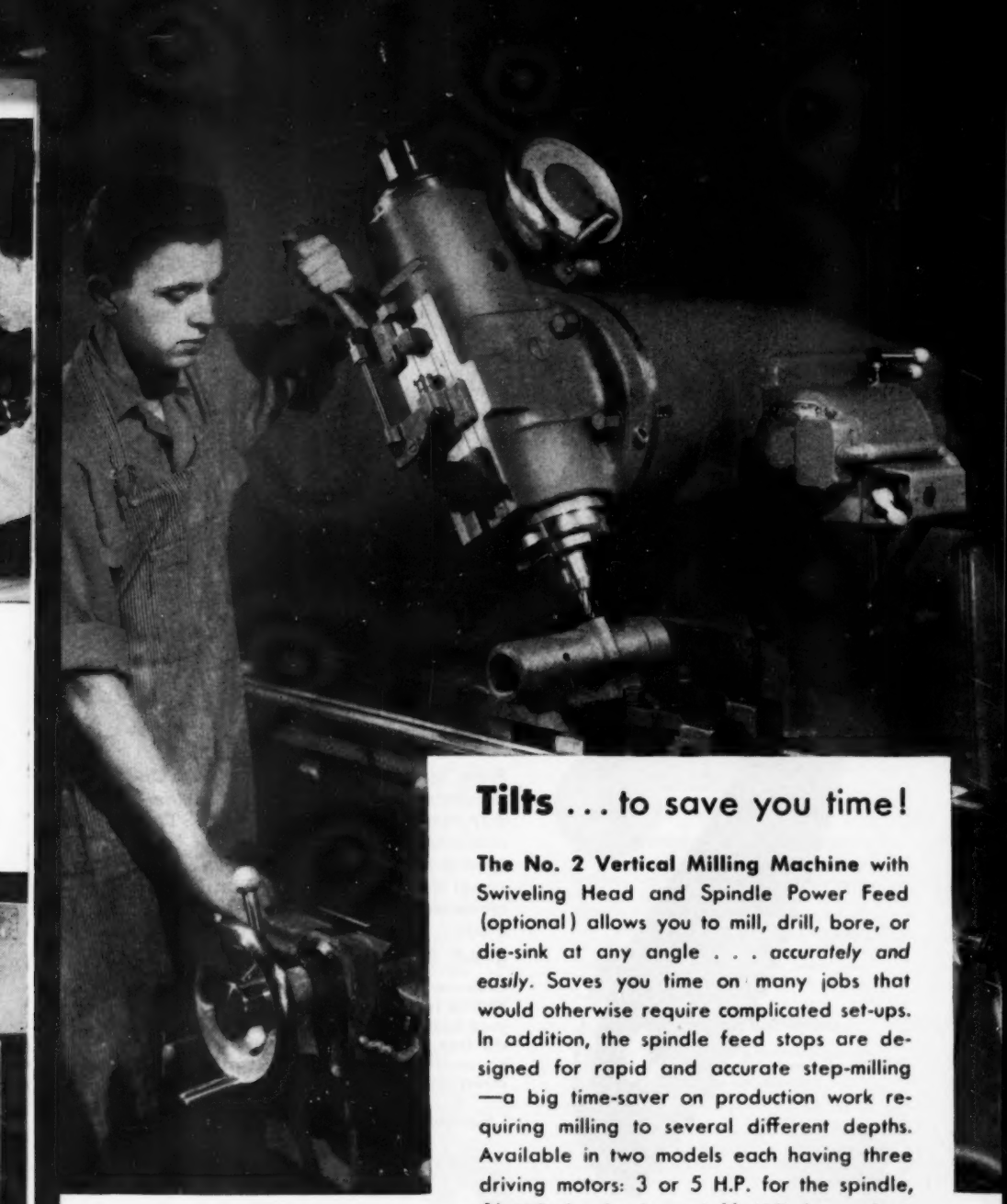


Tilts . . . to save you time!

The No. 2 Vertical Milling Machine with Swiveling Head and Spindle Power Feed (optional) allows you to mill, drill, bore, or die-sink at any angle . . . *accurately and easily*. Saves you time on many jobs that would otherwise require complicated set-ups. In addition, the spindle feed stops are designed for rapid and accurate step-milling —a big time-saver on production work requiring milling to several different depths. Available in two models each having three driving motors: 3 or 5 H.P. for the spindle, ¾ H.P. for feeds, and ¼ H.P. for coolant. Write for complete details. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

B·S

Brown & Sharpe

Star Quality
Costs No More

why not get these
SAFE, UNBREAKABLE
high speed blades
from your STAR Distributor?

For over 75 years, industry has *known* STAR Hand and Power Hacksaw Blades as *quality* blades.

Here, as an example, is the STAR Unbreakable High Speed Steel Blade—safe, fast-cutting, long-lived. The STAR combination of a flexible steel back, special-process weld and high speed steel cutting edge adds up to an efficient, shatterproof, proved-quality blade.

STAR SERVICE COSTS NO MORE

Order any of the complete line of STAR Blades from your Industrial Distributor—your best source of supply for hundreds of the items you need to operate efficiently, economically, and without production interruptions.

Sold Only Through Recognized Distributors

CLEMSON BROS., Inc.
MIDDLETOWN, N. Y., U.S.A.
Makers of Hand and Power Hack Saw Blades, Frames, Metal Cutting Band Saws and Clemson Hand and Power Lawn Machines.

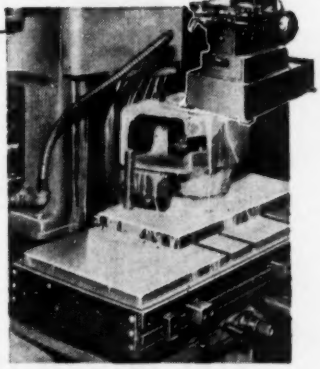
1016

PORTER-CABLE

ABRASIVE-BELT MACHINES

(Now Made and Sold by Engelberg)

Do More Surfacing Jobs FASTER and BETTER



Features high speed cutting by millions of abrasive points imbedded in a continuous belt, cooled and cleaned by water and other coolants. Does close tolerance work on flats, squaring, cylindrical surfacing; deburrs, knocks off corners, forms radii, bevels and other operations. Often does milling, shaping, grinding operations 10 times faster — saves 75-90% set-up time.

PLATEN OR FREE BELT

Model B-6W. Quickly adaptable to flat, curved or irregular pieces. Various shaped platens form the flexible abrasive belt to fit many shapes of work. Free belt reaches inaccessible spots.

CONTOUR GRINDER

Model C-6. For curved or flat-face grinding or polishing. Flexible abrasive belt runs over shaped contact roll. Loaded abrasive wheel no longer necessary. Wide-range adjustments easy for varied work. Saves set-up time and reworking of piece.

FINAL FINISH

Model WG-4. For production runs on small parts, fed freehand or by simplest fixtures. Gives final finish to jobs done on automatics, hand and hacksaws, lathes, milling machines, etc. Grinds carbide tipped tools.

BG8/FT9 Grinds Casting 100% Faster; No Distortion

Problem: Machine two rim surfaces of aluminum oil burner casting with single set-up.
Solution: Model BG8/FT9 with indexing fixture. Both sides are ground without moving the piece. Net grinding time for two surfaces: 15 seconds. This was 100% faster than former milling time. In spite of rapid stock removal there was no distortion.

• FREE SAMPLE GRINDING

We will prove Abrasive-Belt Machining can cut your costs. Send samples for recommendations and actual test grinding. No obligation.

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The ENGELBERG Huller Co., Inc.
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Send case history booklet and name of nearest distributor.

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ATKINS

Silver Steel®

PRECISION GROUND FLAT STOCK

Oil Hardening Tool Steel

- *Now available in all Standard Sizes*
- *Call your ATKINS Distributor*

ATKINS Silver Steel SAWS

ATKINS SAW DIVISION
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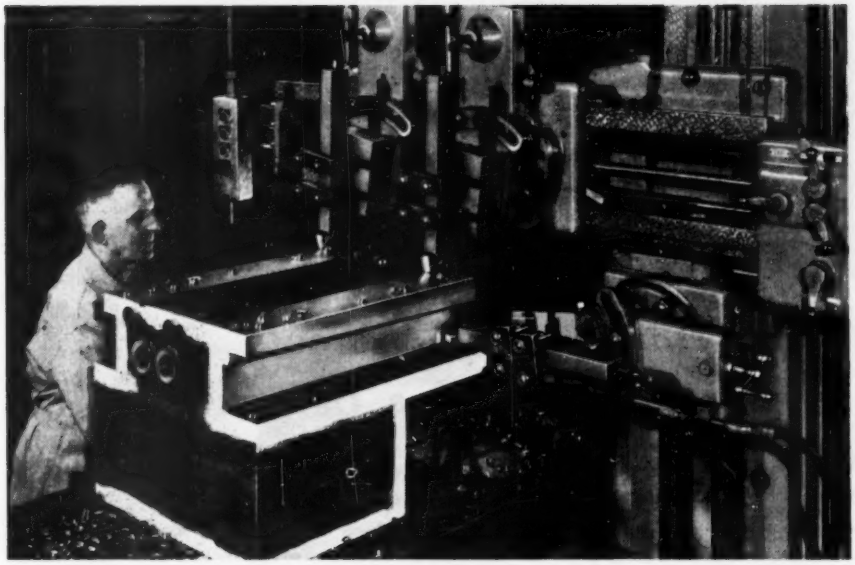
ENGINEERING B-W PRODUCTION

a cost cut with every stroke...

rockford hydraulic-driven

shaper • planers



an exclusive design for efficient production...

The Shaper-Planer is the only production machine tool manufactured exclusively for work which is too large for a shaper . . . and too small for economical production on a planer.

It features versatility and high cutting speeds, combined with hydraulic drive and feeds, in a price class that is hard to equal even by smaller, less flexible machines.

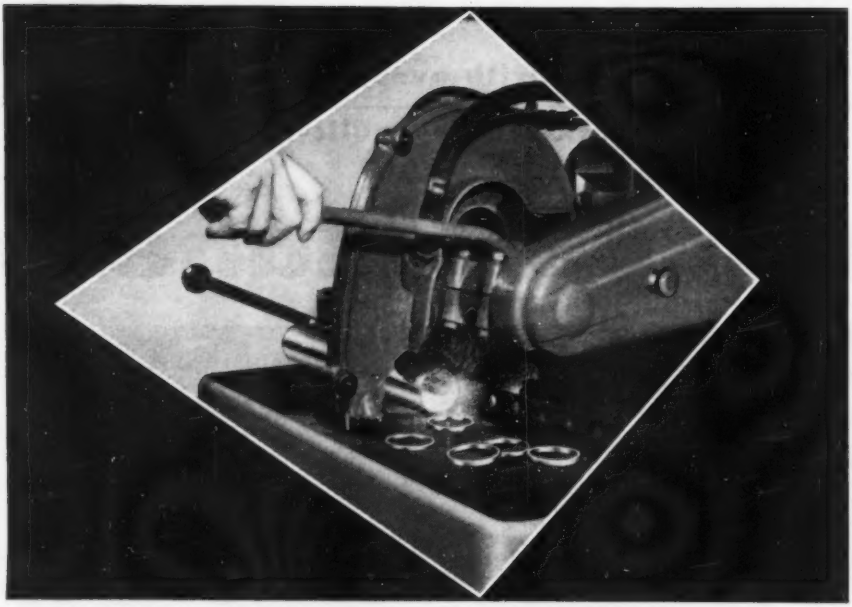
For planing and shaping efficiency in this class of work, get the complete story from your Rockford Machine Tool Co., representative, or write us direct for Bulletin 802.

Available in Openside, Double-Housing and Triple-Circuit Models

OUR 52nd YEAR

ROCKFORD MACHINE TOOL CO.

2500 KISHWAUKEE STREET • ROCKFORD, ILLINOIS



Manhattan Cut-Off Wheels More Use Per Dollar

MORE CUTS PER WHEEL . . . Manhattan developments in both rubber and resinoid bonds greatly increase the number of cuts per wheel with Manhattan Cut-Off Wheels. They cut freer and cleaner too . . . on all types of metals. When you specify "Manhattan" you are assured a wheel custom-tailored for your most difficult cut-off problems. You get "More Use per Dollar" with Manhattan Cut-Off Wheels because they do a faster, better job . . . and they last longer. Let one of our experienced representatives show you how you can save time and money at your plant with Manhattan Cut-Off and other types of high speed, heavy duty wheels.

GRINDING WHEEL INSTITUTE MEMBER

RM 435-R

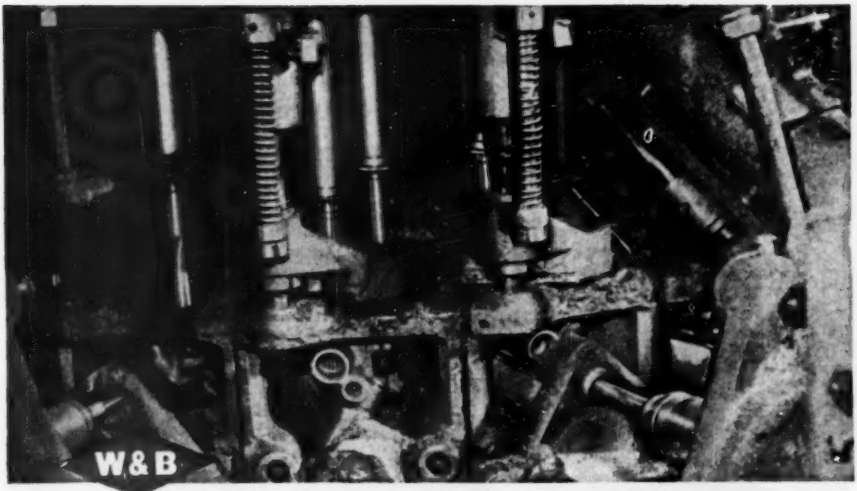
WRITE TO ABRASIVE WHEEL DEPARTMENT

RM

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose
Fan Belts • Brake Linings & Blocks • Clutch Facings • Packings • Asbestos Textiles
Engineered Plastic, and Sintered Metal Products • Abrasive & Diamond Wheels • Bowling Balls



Carbide Drills *Selected* For Long-Life and Increased Production

Illustrated above is a fifteen station vertical automatic indexing machine using sixteen Whitman & Barnes carbide drills ranging from ¼" to 9/16" diameter, two carbide core drills and one carbide reamer. Simultaneous vertical, horizontal and angular drilling of oil pump bodies is done on this machine.

This large manufacturer of automobiles selected W & B carbide drills as a means for increasing production of these cast iron oil pump bodies. Because W & B carbide drills have extra-long-life and provide more holes per grind, his drilling cost is reduced, there are fewer shut-downs for changing drills and maximum production time is obtained from each machine.

W&B

YOUR INDUSTRIAL DISTRIBUTOR
Can Give You Quick Service
On Whitman & Barnes Tools.
Contact Him Today!

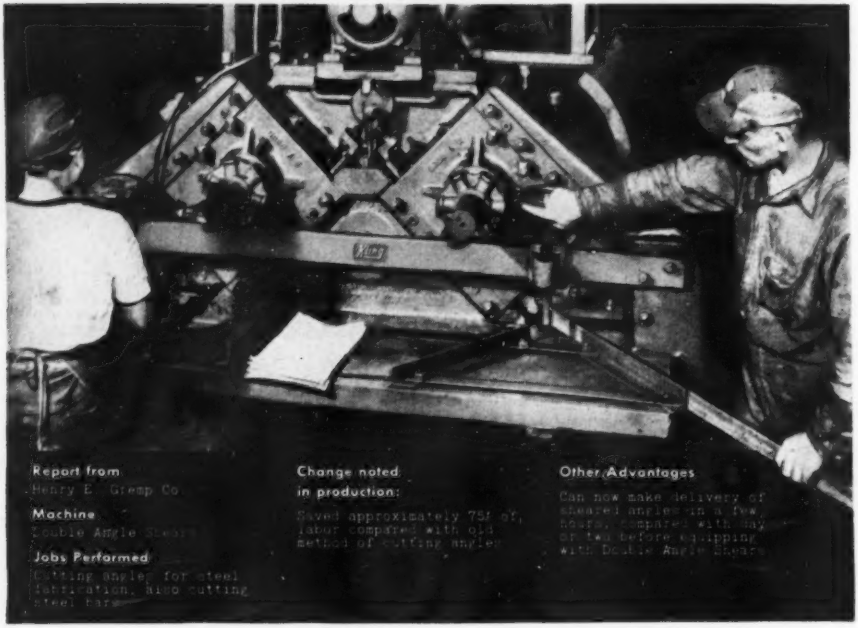
WHITMAN & BARNES

40045 PLYMOUTH ROAD • PLYMOUTH, MICH.

NEW YORK • CHICAGO • LOS ANGELES • ATLANTA

CUT LABOR COST 75%

. . . now do in **HOURS**, what formerly took **DAYS!**


Report from
Henry E. Gremp Co
Machine
Double Angle Shears
Jobs Performed
Cutting angles for steel fabrication, also cutting steel bars
Change noted in production:
Saved approximately 75% of labor compared with old method of cutting angles
Other Advantages
Can now make delivery of sheared angles in a few hours, compares with day or two before equipping with Double Angle Shears

Kling DOUBLE ANGLE SHEARS

cut production costs in the "BEST OF COMPANIES"!

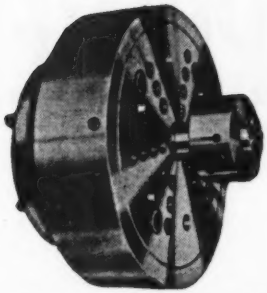
This is the latest equipment for fast, production shearing of all kinds . . . actually two shears in one machine . . . can handle several jobs at one time. For instance, as shown in the illustration above, the Kling Double Angle Shears at the Henry Gremp plant in Chicago, cut angles for steel fabrication on one side and cut steel bars on the other. Flats, angles or rounds all look alike to this "workhorse". If you have considerable mitre shearing, Kling Double Angle Shears can be mounted on a turntable to facilitate handling. Automatic hold-downs and one-shot lubrication can be furnished if desired. Sizes to handle angles up to 8" x 8" x 1½".

Following are a few of the companies using Kling Double Angle Shears:
Auto Specialties Mfg. Co., Elizabeth Iron Works,
Henry E. Gremp Co., Union Iron & Steel Co., International Steel Co.,
Link Belt Company, Joseph T. Ryerson & Co.,
Morris Wheeler & Company, Unit Steel Corporation

Write for free Bulletin that tells you in detail exactly how Double Angle Shears work and what they can do in your shop to save you time and money.

KLING BROS. ENGINEERING WORKS • 1320 North Kostner Avenue, Chicago 51, Illinois
Export Distributor: Simmons Machine Tool Corporation.
50 E. 42nd St. New York 17, N. Y

Since 1892 **Kling** ***...an investment in speed!***

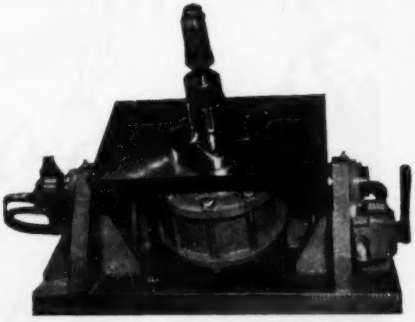


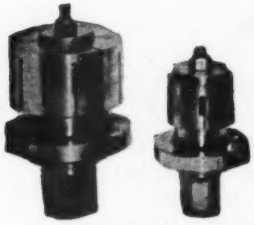
CHUCKS

Parts that can be chucked internally can be chucked faster and machined more accurately on SPEEDGRIP Precision Internal Chucks than by external chucking methods. Standard SPEEDGRIP CHUCKS are made in various sizes. They cover a range of bores from one half inch to eleven inches and can usually be purchased right from stock. SPEEDGRIP engineers are at your service to design and build any standard or special chucking equipment you may require.

FIXTURES

SPEEDGRIP fixtures are designed and built for use on single or multiple spindle boring machines; milling machines; drill presses, etc. At the right is shown a tilting type fixture that is used on a No. 150 Baker Drill. Two air cylinders are used for tilting and clamping the work. SPEEDGRIP fixtures hold workparts securely, position them accurately and usually reduce loading and unloading time.



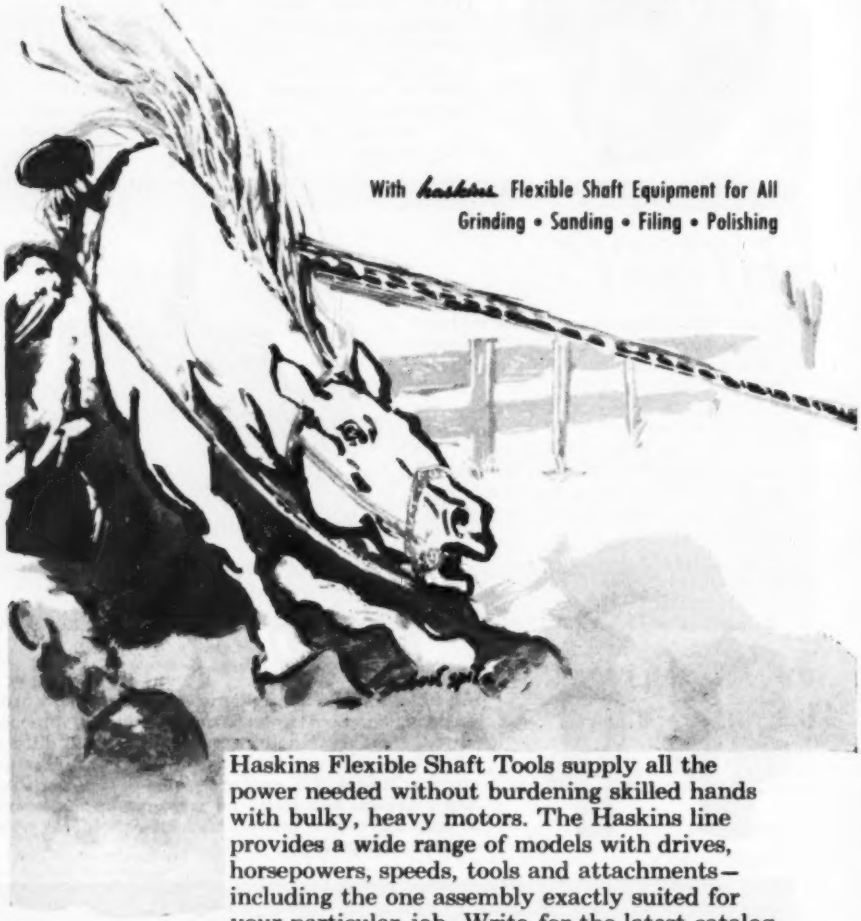


MANDRELS

All SPEEDGRIP Mandrels are made from high grade Alloy Steel, heat treated and ground to precision gages Standard Mandrels are made in ten different nose sizes and use the same bushings as standard chucks. SPEEDGRIP engineers also design and build many special mandrels and welcome an opportunity to help solve your internal chucking problems where special equipment is required.

SPEEDGRIP CHUCK
820 NORTH WARD STREET
ELKHART, INDIANA

ample HORSEPOWER



With *haskins* Flexible Shaft Equipment for All
Grinding • Sanding • Filing • Polishing

Haskins Flexible Shaft Tools supply all the power needed without burdening skilled hands with bulky, heavy motors. The Haskins line provides a wide range of models with drives, horsepowers, speeds, tools and attachments—including the one assembly exactly suited for your particular job. Write for the latest catalog.

haskins

2645 W. HARRISON ST. • CHICAGO 12, ILL.

...out of the weigh!

For over 35 years —virtually from the beginning of the flexible shaft industry—Haskins has led the field. For Haskins Flexible Shaft Tools are quality designed and built for rugged production work— to stand long, continuous usage. That is why Haskins is standard equipment in hundreds of the most efficient plants throughout the country.

Haskins flexible shaft ("power-away from the job") equipment: up to 2 hp.

On any carbide grinding job...

Nothing

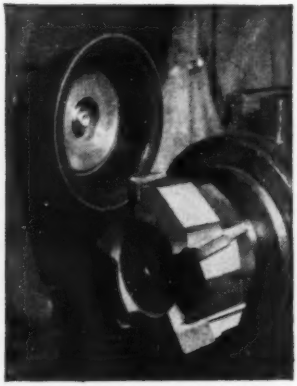
Norton Vitrified Bonded Diamond Wheels

outperform all others of this type. They combine the fast cutting action of resinoid bonded wheels with resistance to grooving approaching that of metal bonded wheels. Great durability is another advantage.

Production Grinding of Single Point Carbide Tools is most economical and efficient with Norton vitrified bonded diamond wheels. Grinding chip breakers, as illustrated, is another important job for which they are ideal.

Norton Resinoid Bonded Diamond Wheels

combine fast cutting with long, money-saving wheel life that makes them favorites for precision sharpening. Made in two bond types — regular, for wet grinding and B6, for dry grinding. It is always more economical to use each bond type on the applications for which it is best suited.



On Your Multi-Tooth Grinding Jobs, Norton resinoid bonded wheels hold size so that each tooth gets uniform grinding. The straight, thin shapes make excellent cut-off wheels for salvaging damaged carbide tools.

Norton wheel cuts like a diamond

Diamond wheels in carbide grinding more than pay for themselves. "It's just like finding money."

You can cut grinding time — and grinding costs — to the lowest possible by standardizing on Norton diamond wheels.

As a result of Norton Company's long pioneering† in diamond wheel development, Norton diamond wheels bring you a combination of long service life and efficient cutting action that means maximum economy — across the entire range of carbide grinding applications.

Besides the vitrified and resinoid bonded types shown here, Norton diamond wheels are also available in a metal bond — where durability and resistance to grooving, rather than a fast rate of cut, are primary considerations. For every application the proper size and type of Norton wheels are available in a wide variety of grit sizes. (*For small-volume requirements, Norton K Bond* CRYSTOLON *wheels are often the best investment. See small illustration.*)

See Your Norton Distributor

for aid in selecting the right Norton wheels for every grinding job. And ask him for the 142-page, illustrated booklet: "Grinding Carbide Tools." Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities. Listed under "Grinding Wheels" in your classified phone directory. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

Norton K Bond CRYSTOLON* Wheels feature fast, cool cutting and exceptionally uniform performance. The vitrified K Bond permits half-grade increments of hardness, enabling you to "pin-point" your specifications.

For Small-Volume Carbide Grinding, especially in single-point applications, the K Bond wheels offer outstanding economy. Their high stock removal rate and uniform performance assure quality grinding at lowest cost.

W-1580

NORTON

Making better products . . . to make other products better

and its BEHR-MANNING division

NORTON: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

†First with resinoid bonded, first with metal bonded, first with vitrified bonded diamond wheels.

JOHNSON ELECTRIC MOTOR BEARINGS

Greatest selection on the Market

Catalog lists, illustrates and describes each bearing. Write today for your copy.

NOW you can replace any sleeve bearing in any make of motor. There are more than 340 individual bearings—from stock at your authorized Johnson distributor and Johnson warehouses. In every case Johnson EM Bearings are equal to or better than the original equipment. They are correct in design, tolerance and alloy, ready for immediate installation. Each bearing is made to precise motor specifications, flanges, oil holes, oil grooves, slots and tolerances correct for each job.

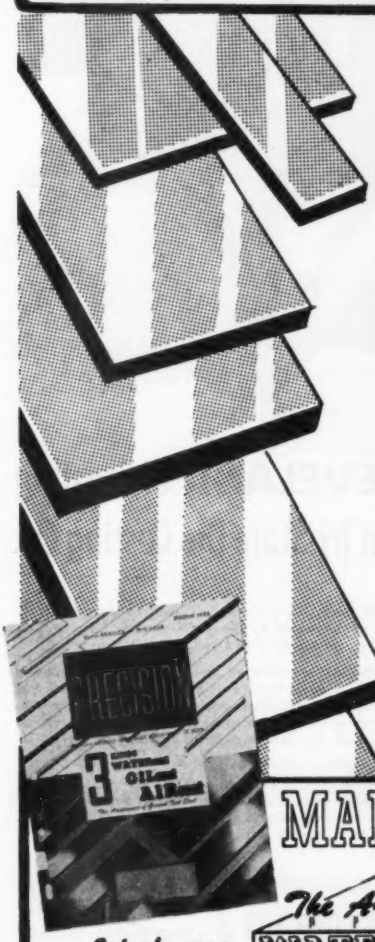
JOHNSON BRONZE COMPANY
615 South Mill St., New Castle, Pa.

JOHNSON B BEARINGS
Sleeve-Type

★ NOW 803 Sizes and Long Length PRECISION

GROUND FLAT TOOL STEEL

3 KINDS– Ready For the Layout Bench



★ OILcrat

An outstanding product of carefull handling assures you of a fine-grained electric furnace oil-hardening ground flat stock. Over 386 standard sizes in stock.

★ WATERcrat

A fine grained electric furnace high carbon tool steel. It has been wet ground to remove all bad surfaces and to assure you of a velvet finish of virgin metal.

★ AIRcrat

This air-hardening tool steel shows less size change and offers a greater safety in hardening than either of the other grades. The Aristocrat line receives complete protection against rust through carefully prepared anti-rust Oil and also sealed in a strong craft envelope that is lined with aluminum foil.

MARSHALL STEEL FREE OF DECARBONIZATION.

★ ★ ★ ★ *LOW CARBON — LOW COST* ★ ★ ★ ★

MARSHALLCRAT

Over 190 standard sizes in stock. Write for catalog. Compared to Tool Steel Ground flat stock it gives you up to 60% *SAVINGS in STEEL COSTS!* Use it for Jigs, fixtures, parts. *EASY TO MACHINE — GRINDS TO A GOOD FINISH. EXCELLENT WELDABILITY.*

MARSHALL STEEL CO.

McCOOK, ILLINOIS

The Aristocrats of Ground Tool Steel

WATERcrat | OILcrat | AIRcrat | LC

Write FOR FREE CATALOG

P. O. BOX 108 LA GRANGE, ILLINOIS

Partial view of the aluminum die cast department of the Tri-State Die Casting Co., showing Cleveland Model 400's producing the Servel Automatic Ice Making Unit.

Servel "IceCircles" take shape...

in CLEVELAND die casting machines at Tri-State Die Casting Co.

The ice-making unit, the aluminum casting shown at left, for the unique Servel Automatic Ice-Maker Refrigerator, is produced by the Tri-State Die Casting Co., Henderson, Ky., in a battery of Cleveland Model 400 Die Casting Machines.

The high metal injection pressure obtainable with the Cleveland Model 400 assures a sound, dense casting, free of all porosity and surface defects . . . highly important in this aluminum casting as any slight imperfection could cause difficulty in dislodging the ice from the mold. "*Scrap on this job is practically nil*" is the report from Tri-State, indicating the high quality of the *hardware finish* castings delivered by the Cleveland machines.

This is another example of how the nation's leading die casters rely on Cleveland dependable performance. To get the most from *your* die casting department—in speed of production and quality of casting—investigate the advantages of the Model 400 Cleveland. Bulletin 400 gives you complete information. Write for your copy.

THE CLEVELAND AUTOMATIC MACHINE COMPANY

4934 Beech Street
Cincinnati 12, Ohio

SALES OFFICES: CHICAGO
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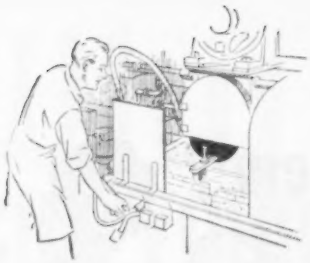
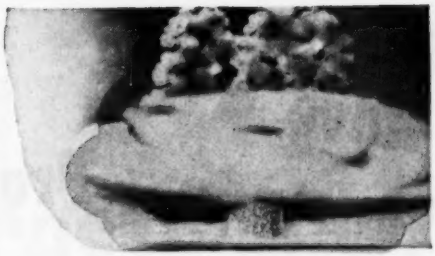
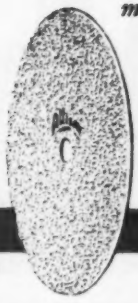
Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines





HOW *ABRASIVE* CUTTING GAVE *EACH* A VALUABLE ASSIST!

Modern industry recognizes the key importance of "new" high-temperature-resistant alloys in the development of jet engines and atomic energy. Neither development would have been possible otherwise. Yet too few production managers know about the valuable assist rendered by Allison Abrasive Cutting. *Abrasive cutting has consistently proved itself the only economical and efficient method for cutting these extremely tough wonder metals.*



Allison wheels have been developed to cut any of these metals. They are standard wheels, requiring no special machines or cutting techniques.

Tough Cut-Off Jobs Are Easy . . . with Allison.

3AL54B

The *best* way to cut many materials . . .

the *only* way to cut some.

Allison ABRASIVE CUTTING WHEELS

THE ALLISON CO., 264 ISLAND BROOK AVENUE, BRIDGEPORT 8, CONN.

Have You A Bending Problem?

Pipe, tube and structural bending is now simplified with a PEDRICK PRODUCTION BENDER. Heretofore difficult bends, such as offsets and off-plane bends, can now be made in production quantities at an amazingly low cost. All PEDRICK PRODUCTION BENDERS are complete with motor, and are equipped with automatic duplicate bending relays.

Write For Descriptive Folder, Dept. 3

Prices start as low as $1575.00

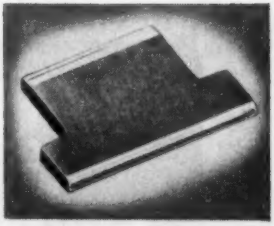
(Motor and all Electrical Equipment included)

PEDRICK TOOL & MACHINE CO.

3640 N. LAWRENCE ST., PHILADELPHIA 40, PA., U.S.A.

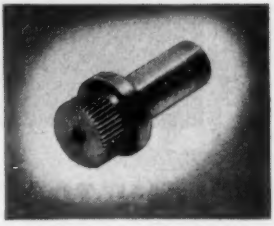
Why wait?
CUT YOUR COSTS NOW!

TEN TIMES FASTER than previous methods—broaching top and bottom radii on these automatic transmission reverse band anchors is helping one manufacturer lower the break-even costs. The broached part is not only more accurate, but thousands of the anchors are being machined between broach sharpenings.



THIRTY TIMES FASTER than milling—broaching the intricate shapes of these copper breaker points has meant lower costs. Seven pieces are broached at a time using only two sets of Colonial broaches. 75,000 breaker points are completed before it is necessary to sharpen the broaches.

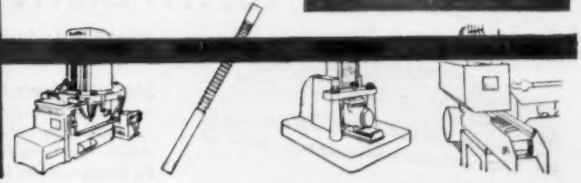
TWENTY TIMES FASTER than other methods—serrations on this shaft are cut with a button broach in a single pass. Hundreds of other applications on file at Colonial attest to the tremendous cost-cutting potential of "Unified Broaching." Send us prints of your parts—we'll show you how to cut costs.



Let the leading manufacturer of broaching equipment show you how to lower your break-even costs.

Unified Broaching

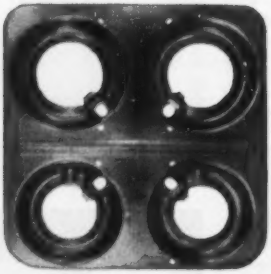
COLONIAL

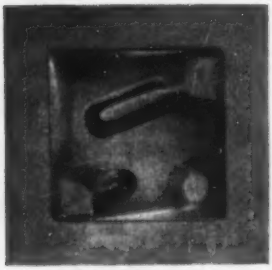


Plastic Low Cost Tooling

For

Dies . . . Drill, Welding, and Assembly Jigs





Vulcan, keeping pace with modern tooling, can recommend plastic tooling for medium production on numerous tool programs.

Plastic tools are light in weight, have good impact, compressive strength and dimensional stability. No hand finishing of parts required as galling or marking is eliminated by using plastic form dies.

Contours and odd shapes are cast or laminated to suit individual tools, saving expensive machine and hand finishing operations.

Plastic tools, built in a matter of days instead of weeks, lower your tool costs for those medium production runs.

Our actual production figures prove plastic has a definite place in modern production.

Vulcan Tool Company's organization, building fine tools since 1916, believes new tooling developments must be proved by tool engineers. Since plastic is not a cure-all your problem should be handled by recognized, practical tool men.

Our engineering staff will recommend the correct plastic material and advise if parts of your tooling program should be in plastic.

Send a part print and your production requirements for quotation and recommendations.

VULCAN TOOL CO. . . . PLASTIC TOOL DIVISION

Highland Avenue, Dayton 10, Ohio

Major Vulcan Services

Engineering, Processing, Designing and Building Special Tools . . . Dies . . . Special Machines . . . including the Vulcan Hydraulics that Form, Pierce, Assemble and Size, Vulcanaire Jig Grinders, Plastic Tooling.

MILESTONES IN MEASURES

During the time of the Norman Conquest, ***a yard was fixed by law to be the distance between the King's nose and the end of his outstretched hand.*** This, however, was not very stable, as the standard changed with every reigning monarch.

Some 4000 years ago, when the Pyramids were being built on the Egyptian sands, there was a definite system of measurement. Not as accurate as our present day methods, but nevertheless, they served their purpose. ***The standard, was the cubit, the length of the human forearm.***

TODAY...

Use Size Control Co.'s *reversible* gages for greatest economy and reliability!

Fixed gages for measuring holes were solid cylindrical pieces. These solid pieces were inefficient by modern gaging standards because as soon as the GO end was worn—the gage had to be thrown away.

Later, a taperlock gage was developed and this was a step in the right direction because GO ends could be replaced when worn.

Size Control Company improved the taperlock design early in World War II when they originated the ***reversible*** thread plug gage with the following advantages: Member can be reversed when end is worn . . . worn ends can be cut off to expose several additional gaging surfaces . . . this increases gage life many times . . . members can be adjusted for length of hole.

THE FINEST GAGES MADE . .

SIZE CONTROL COMPANY

2500 West Washington Boulevard
Chicago 12, Ill., MOnroe 6-6710

A Division of the
AMERICAN GAGE & MACHINE COMPANY

Send for Size Control Catalog 53 to learn of many more economical and quality-building features.

Diamonds are a tool's best friend

Hard cemented carbide cutting tools demand keen edges, extra-fine finishes, close tolerances...and you'll get all this with Diamond Wheels by CARBORUNDUM. They cut cool —increase tool life...hold size and profile—give the sharpest edges—where sharpness is important... reduce grinding time—often eliminate intermediate operations... save you money—one wheel grinds thousands of tools. For roughing dull or broken tools...use GREEN-GRIT Silicon Carbide Wheels by CARBORUNDUM. For expert counsel, fast service for every tool grinding operation, call your CARBORUNDUM Distributor or Salesman.

Through product quality and application "know-how"

CARBORUNDUM

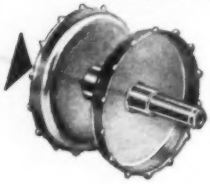
REGISTERED TRADE MARK

continually puts more sense in your abrasive dollar

LUX CLOCK
keeps a date with

PRODUCTO

New design DIE SETS

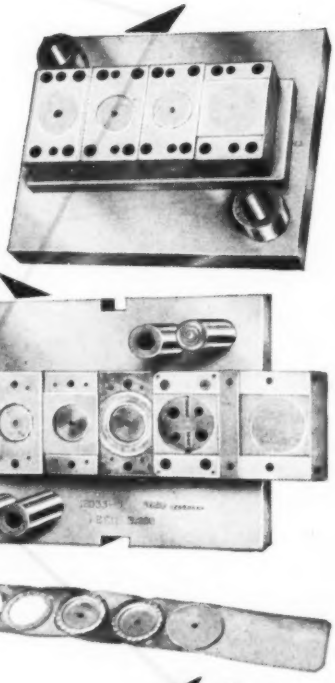


In order for the date band on this Lux "date-minder" calendar clock to operate evenly and line up accurately, it is essential that the date drum sprockets, above, be concentric. This accuracy can be traced directly to the Producto die set which controls the stamping of this part. With a center hole tolerance of .001 and with a 6000-per-hour stamping speed, it is easy to see why the die set must be a highly precise, yet rugged, instrument.

Producto new design die sets combine precision machining and boring; close-tolerance, individual honing of pins and bushings; plus a "reserve strength" feature, into a carefully assembled and inspected product — your long-run guarantee of stamping accuracy and insurance against die breakage.

Whether catalog or special, every Producto die set is an instrument of precision.

For die set accuracy . . . call your nearest Producto branch.



FOR PRECISION DIE SETS FAST, CALL...

THE PRODUCTO MACHINE COMPANY • 960 Housatonic Ave., Bridgeport 1, Conn.

ALSO MAKERS OF DIE ACCESSORIES, FEEDING EQUIPMENT, VISES, MACHINERY

PRODUCTO

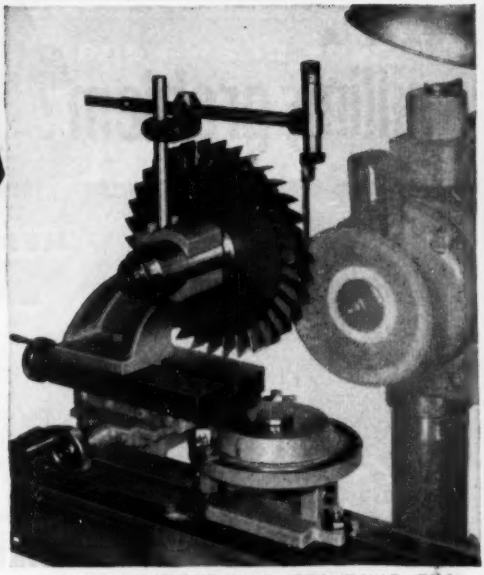
3PDS4B

THE UNIVERSAL RADIAL CUTTER GRINDING FIXTURE

Does 5 Operations without removing cutter from its ARBOR!

On cutters up to 8" in diameter, the No. 6 fixture, as shown with our No. 6A heavy-duty, right-angle, ballbearing spindle workhead:

Sharpens side teeth on **both** sides.
Sharpens peripheral teeth.
Generates small or large radii on **both** corners of each tooth.
(Other workheads available)



▲ THESE DEPENDABLE GRINDING FIXTURES SAVE THE LIFE OF YOUR CUTTERS. Write for our catalog 602

◀ UNIT 1A
This Universal Cutter Grinding Fixture fits any universal tool or surface grinder.

UNIT 5
Universal Index Workhead for universal tool or surface grinder. ▼

▲ UNIT 4A
Radial Grinding Fixture for sharpening fluted end mills with square, conical, or ball-nose mills. The index disc provides for multi-flute cutters.

Radial Grinding Attachment D combines with Unit 1A for sharpening end mills with square, conical, or ball nose shapes. ▼

ROCHELEAU TOOL & DIE CO.
650 North Main St., Leominster 1, Mass.

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HAVE A

milling problem?

HERE'S YOUR ANSWER

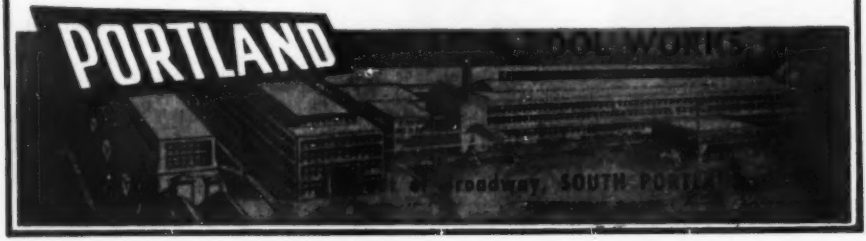
PORTLAND'S HEAVY DUTY MILLING HEAD

The PORTLAND milling head was especially designed and engineered to solve heavy duty milling problems . . . milling of armor plate, special alloys, etc. These heads are easily adapted to outmoded planers . . . converting them into powerful, modern, efficient planer-type milling machines.

SPECIFICATIONS

- Heads provided with 22 speeds in ranges up to 1000 RPM
- Infinitely variable Hydraulic feed from 0 to 60" per minute
- Designed for right and left hand, horizontal and vertical operation
- Horsepower ratings available from 10 to 100

Write for complete information today
Ask for Bulletin BB

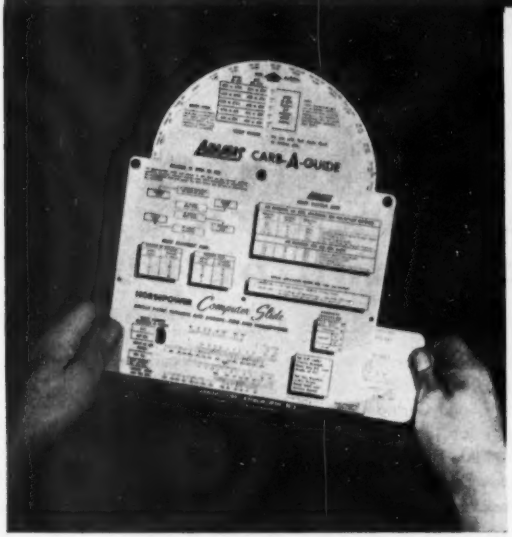


for quick, sure answers to your carbide application problems . . .

ADAMAS

TUNGSTEN CARBIDE

CARB-A-GUIDE



Designed by Adamas as another special service to users of metal working tools . . . CARB-A-GUIDE puts thousands of answers at your fingertips. Selects proper speed, carbide grade, tool angles and chipbreaker dimensions for your specific feed and depth of cut . . . on *63 different materials.* Shows how to make necessary adjustments in speed, feed, and grade. Includes speed conversion, milling feed, horsepower computer slides. Send for your CARB-A-GUIDE today. It's your assurance of getting maximum efficiency from the best in tungsten carbide—Adamas Carbide.

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$3,000 SAVINGS IN LABOR WITH $100 WORTH OF CARBIDE BURS

A CASE HISTORY: One of our customers had an extremely difficult problem of burring some piece parts after assembly. After consultation with Atrax engineers, it was determined that Solid Carbide Burs were the only type that could be used to salvage this huge job. Six Carbide Burs were bought for this job, totalling approximately $100.00. They saved the company over $3,000.00 in labor. Besides this, they made possible salvage of very valuable piece parts for a very nominal original investment.

Possibly our engineers or sales representatives can help YOU achieve similar savings. You'll find them in all principal cities, ready to consult without any obligation.

NEW! Complete 88-page Manual and Catalog of Carbide Tools. Write for your free copy.

THE ATRAX COMPANY NEWINGTON 11, CONNECTICUT

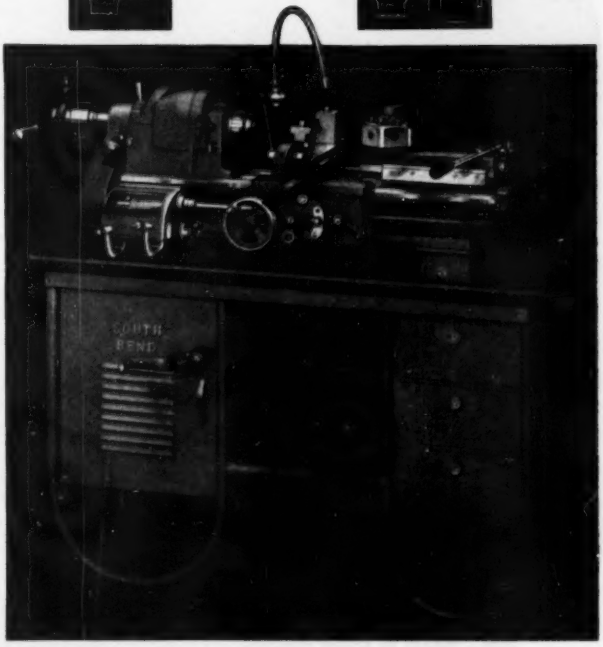
SOUTH BEND

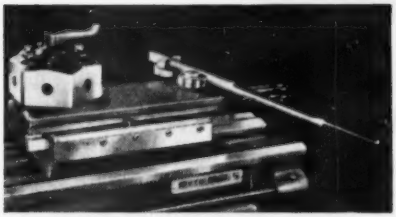
SERIES 1000 *PRECISION* TURRET LATHE

This precision turret lathe meets the demand for fast, efficient production of small precision parts. It has the accuracy for close-tolerance operations; ample power for smooth performance; and rigidity for producing a fine finish. Especially practical for second operation work of many types.

1" COLLET CAPACITY

1-3/8" SPINDLE BORE





HANDLEVER BED TURRET

Turret will index within plus or minus .0005" at 4" from turret face. Turret head may be back-indexed or spun to skip tool positions. Individual feed-stop screws. Maximum distance between spindle nose and turret face is 19-3/8" at start of indexing.

1000 Turret Lathe prices begin at **$1574.**

Compared with our costs
OUR PRICES ARE LOWER
than they were back in 1941

Prices are closely tied to costs. Costs are still rising. Buy now before increased costs necessitate higher prices.

SEND INFORMATION CHECKED:

☐ 9" and 10" BENCH LATHES ☐ 10" to 16-24" FLOOR LATHES ☐ DRILL PRESSES ☐ TOOL GRINDERS ☐ ½" & 1" Collet TURRET LATHES ☐ 7" BENCH SHAPERS

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Building Better Tools Since 1906 • **SOUTH BEND LATHE** • South Bend 22, Indiana

Backlash Eliminator

Means More Work in Less Time

An important feature of the *1218 Hydrabrasive Surface Grinder* is its crossfeed backlash eliminator. Instead of having to "back off" the crossfeed adjustment and "come up" to the proper setting each time, the backlash eliminator permits fast precision tranverse adjustments in either direction. You can be sure a movement of .0001" on the crossfeed handwheel equals a .0001" movement of the saddle.

This is another reason why the 1218 Hydrabrasive turns out so much work so accurately, and so easily. For detailed catalog on this fine, modern surface grinder, write Abrasive Machine Tool Company, 14 Dunellen Rd., East Providence 14, R. I.

ABRASIVE
ACCURACY BOOSTS PRODUCTION

Abrasive Quality is Reflected in the Finish of Your Product

NEW!

ROTOR AIR SCREW DRIVERS AND NUT SETTERS

Powerful! Light!

Rugged . . . long-life construction

More power per pound

Simplified torque adjustment

3 types of drives

Reversible or non-reversible motors

TYPICAL SPECIFICATIONS
Reversible* . . . Adjustable Clutch† Type

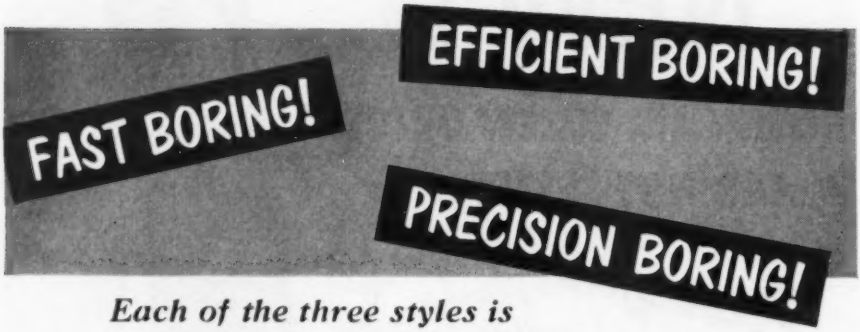
Type	Handle ¼" Air Inlet	Free Speed at 90# Pres.	CAPACITY Free Run. Screws	Bolt Size	Wt. (Lbs.)	Lgth. (Ins.)	Spindle Side to Center (In.)
S-02-PRC	Pistol	2000	#2 to #12	To ¼"	2¼	8¾	21/32
S-02-PRC	Pistol	850	#2 to #12	To ¼"	2½	9¼	21/32
S-02-PRC	Pistol	450	#2 to #12	To ¼"	2½	9¼	21/32
S-02-LRC	Lever	2000	#2 to #12	To ¼"	1⅞	10	21/32
S-02-LRC	Lever	850	#2 to #12	To ¼"	2⅛	10½	21/32
S-02-LRC	Lever	450	#2 to #12	To ¼"	2⅛	10½	21/32

*Also Non-Reversible †Also Positive Clutch and Direct Drive

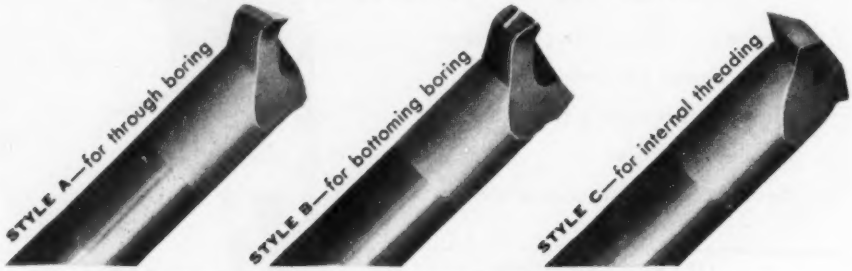
Here's how to drive assembly costs down

WRITE FOR BULLETIN No. 46

These phrases briefly describe the Performance of Bokum Boring Tools



Each of the three styles is designed for its own specialized purpose:



All the styles are characterized by the same

UNIQUE FORM
HELICAL BACK OFF
RESHARPENING ON ONE FACE ONLY

Available in high speed steel, carbide-tipped, solid carbide — in standard sizes and with short neck lengths. Put up in special wooden boxes in a variety of size assortments to meet your specific needs.

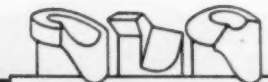
Write to Dept. H for complete catalog.

No. 1139-6—HSS

No. 398-6—Carbide-tipped

No. HSS 500—Short neck lengths

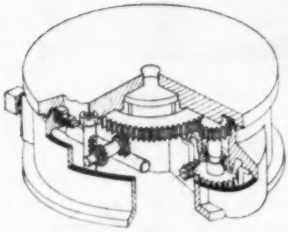
No. CT 500—Short neck lengths (carbide-tipped)



BOKUM TOOL CO.

14775 Wildemere Ave., Detroit 38, Mich.

new HYDRAULIC INDEX TABLE WITH BUILT-IN SAFETY FEATURES



✔ **SIMPLE DESIGN**
Merely a worm and a worm gear.
Notice the cut-away drawing.

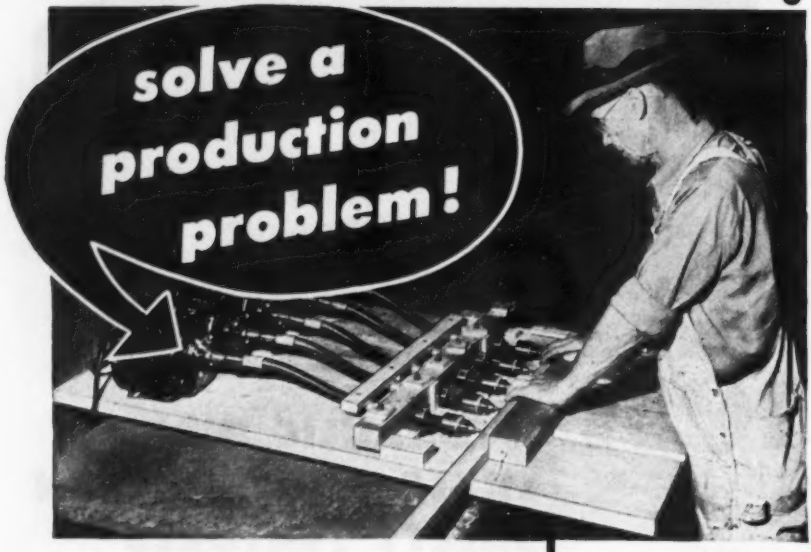
✔ **COMPLETELY HYDRAULIC OPERATED**
The Index Table is driven by a fluid drive motor to provide smooth operation.

✔ **PROVIDES YOU MAXIMUM SAFETY**
Electrical failures in any unit—engaging fixtures with drill head, while the table is in operation—stops the table automatically.

Now available in four sizes—20", 30", 42" and 60"
Can be bored for any number of stations (2 to 15)

Michigan DRILL HEAD CO. Detroit 34, Michigan
engineers and manufacturers of production machines and drilling equipment

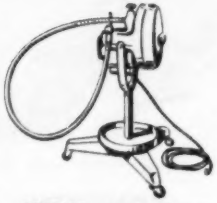
INGENUITY and STOW Flexible Shafting



THE H. T. Hunt Co., of Binghamton, New York, took a contract to make several thousand newspaper racks. One of the principal production problems involved in this job was the drilling of thousands of holes—which were at first drilled individually—using a templet. *This method was inefficient, costly, and time consuming.*

The Hunt Co. then decided to use five STOW tool shafts—driven by five ¼ HP motors—in the arrangement shown above, to drill five holes at once.

Perhaps your ingenuity—and a STOW flexible shaft machine can solve one of your production problems, or do a drilling, brushing, grinding or sanding job better!



STOW streamliner flexible shaft machine.

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STOW MANUFACTURING CO.
30 Shear St.
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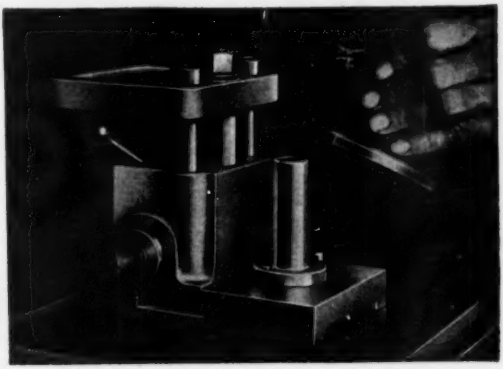
BIG SAVINGS *in* PRODUCTION TIME ...*and* INCREASED ACCURACY!

...yours with the New A·B·C LIFT SWING Drill Jig VISE



The PATENTED "Swing Away" Top Plate can be moved completely out of the way, permitting faster loading, easier nesting, ready inspection of the part, simplified and easier unloading.

Placed over the work in locking position, the Top Plate is aligned in the same way as a precision Die Set, by means of two hardened and ground bushings which glide over immovable, precision ground guide pins. There is no play to permit inaccurate registry.

A positive and simple locking mechanism locks the fixture securely, with a slight pressure on the handle. The same slight pressure releases the top plate and raises it to swing position. *Drill in TWO places* — The Lift Swing feature can be laid on its back to perform drilling operations in *second* plane, 90° from that of the original drilling.

"Impossible holes" become possible — Using a *double* top plate which can be swung a full 180°, you can drill two holes side by side with a minimum wall thickness between and without regard to the wall thickness of the drill jig bushings themselves. Also, you can drill a smaller or larger hole without removing the piece from the fixture. You simply drill, lift, swing plate — then lock and drill again.

Write for Color Circular L. S., which gives detailed engineering information, diagrams, range of plate and fixture sizes, etc. Demonstration in your own plant may be arranged. No obligation.

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If you use presses, let a Cleveland Engineer show you how rugged Cleveland Presses will improve your operating economy. Available in a complete selection of types and sizes, modern Cleveland Presses feature *sturdy frames, extra long gibbing* and the revolutionary *Cleveland (patented) Drum Type Friction Clutch.* Write or call today!

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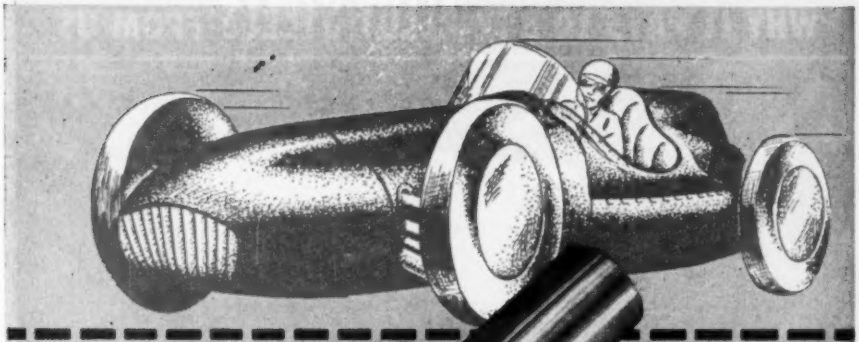

R and L TAP AND DIE HOLDER

WHEN SECONDS COUNT

The R and L TAP AND DIE HOLDER readily changes from right to left due to the patented instant release action. It can also be adapted to work on short threads, do bottom tapping, or die up to shoulders.

Releasing or non-releasing, (also furnished for acorn dies), this tool is made in a complete range of sizes from ⅝" diameter shank to 1½" diameter shank.

Fig. 1. Ready to start threading operation.

Fig. 2. Instantly engaged to full contact.

Fig. 3. Fully released. Note ample clearance between contact points of clutch.

RIGHT R and L LEFT TOOLS

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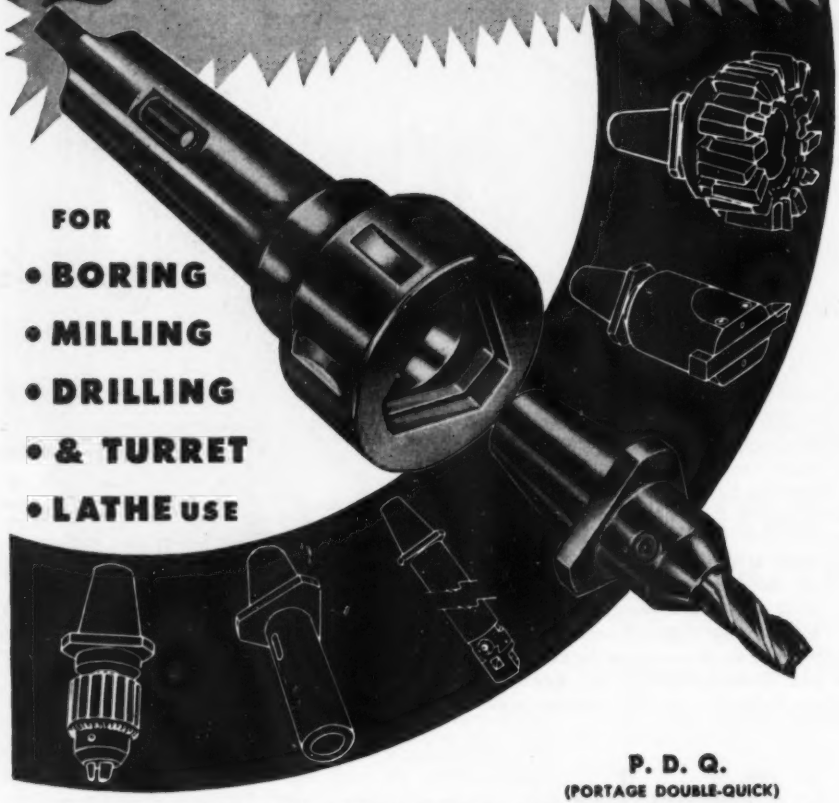
Quick Change Tools



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Changes from one tool to another is a matter of seconds. Three point locking feature and tapered shank assures repositioning and eliminates "run out."
Send for catalog describing individual holders and adapters or for specific information on your machine tools.

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Featured IN THIS ISSUE

Turning Titanium Jet Compressor Discs **159**
New Fluteless Drill is 66% Cheaper **170**
Time Study . . . Part 2 ..... **200**

Turning Titanium Jet Compressor Discs, by John L. Elliott. This report is based on experience in the successful machining, on an experimental level, of titanium compressor discs for jet aircraft engines. Mr. Elliott is process engineer for Tracer Control Co., Hazel Park, Mich. Page **159**

New Fluteless Drill is 66% Cheaper, by Howard A. Hayden. An interesting departure from accepted drill manufacture. From new concepts a fluteless drill, fabricated with little regard for conventional techniques, has been developed that is said to produce superior results at less than half the cost. Page **170**

An Indicator Gage For Testing Squares, by James Pearman. Page **172**

New Setups Facilitate Grinding of Typewriter Components, by Herbert Chase. Tool engineers at IBM have developed a circular rotating fixture to increase the grinding rate on channel-like stampings for electric typewriters. Production goes up, cost down. Page **178**

Shop-Built Special Tools Save 300% Labor-Materials, by James Joseph. When are special shop built tools worth their extra cost? That depends, as Mr. Joseph aptly points out in this interesting article; but, more often than not, the big specials more than hold their own in the final analysis. Page **186**

Roller Conveyor Reduces Idle Time; Circular Replaces Linear Flow, by Tom Brown. Two ideas presented here by this consulting engineer—Handling time reduced on milling operation by utilizing a roller conveyor to load and unload heavy castings. Loading or unloading takes place during machining.—In a packaging and assembly operation, output was increased 15% by placing the workers around a circular table. Formerly a straight line conveyor was used. Page **192**

A New Look At Surface Plates, by A. P. Dieffenbach, Goodman Mfg. Co., Chicago. The surface plate is one of the prime requisites for meeting present day demand for greater accuracy in machine tool work. Heretofore, of mostly square or rectangular design, some of the newer types, such as the round, give the optimum performance in certain instances. Page **196**

Time Study . . . part 2, by Harold R. Nissley. This is the second part of an interesting series on time study. Part 1 began in August. The present article is concerned with what constitutes a normal operator and how he is selected. Definitions in time study work are extremely important. Also discussed is rating the time study. Page **200**

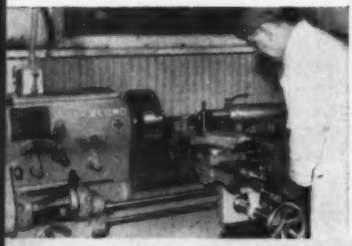
Keep Quality Up and Costs Down, by Edmund Mottershead. Another of the popular articles on management by this authority. The writer shows how one midwest firm attained a goal by using the old "army system" chain of command, in an informal homey approach to the problem of cost and quality. Page **241**

Special Report on Presses. Part 3, Report number 41, discusses American built presses. Page **245**

Popularity of Horizontal High Production Presses Increases. This is a discussion of the Multi-Slide press, frequently known as four-slide press. Operational principles and tooling are discussed. Page **245**

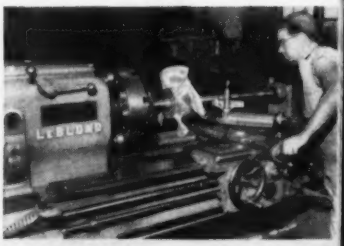
Versatile LeBlond Lathes Knock Down

In Chicago, Ill., LeBlond 16" Heavy Duty Engine Lathe finishes 12" steel blank for roller die used in cold roll forming mill at U.S.G.'s Hermosa Plant. Machine does wide variety of maintenance jobs—same day was used to thread slitter arbor for an expanded metal lath machine. T. F. Heneghan, Engineering Supt., says LeBlond Lathe gives U.S.G. "faster maintenance". Ask for Bulletin HD-125-A.



In Norfolk, Va. versatile LeBlond 19" Regal Gap Lathe recuts welded boot scraper shaft. Exacting precision is number one requirement here. Note removable bed section is in place on this job, can be removed to accommodate work up to 27¼" diameter. Ask for Bulletin R-PG-1-A.

In Ft. Dodge, Iowa, LeBlond 17" Regal Lathe bores sprocket to ±.001". Sprocket must fit bearing shaft also turned on the LeBlond. Plant Engineer, John F. Hoertz, says, "This lathe holds tolerances better than previous lathes, saves tool life, speeds up maintenance work . . . ". Ask for Bulletin R-135-A.



In Greenville, Miss., LeBlond 16" Heavy Duty Engine Lathe dresses down shaft for flume return pump, part of the water return system at U.S.G.'s Pressed Board Plant. Other jobs include machining precision bearings for Pelton pump, turning down built-up bushing on universal joint for a steam press—typical of the great variety of turning work now done in U.S.G.'s own shops. Many used to be jobbed out—cost extra time and money. Ask for Bulletin HD-125-A.

"Upkeep" Costs for U.S. Gypsum

16 U.S.G. Plants from Maine to California

depend on LeBlonds for speedy, economical maintenance.

Dozens of turning jobs that used to be "farmed out" by U.S. Gypsum Plants now get done at less cost and *days sooner*, right in U.S.G.'s own maintenance shops—thanks to versatile LeBlond Lathes.

With U.S.G.'s quarry-to-finished-product operation, plant machinery ranges from huge mining equipment—to processing machinery—to speedy conveyors—to intricate packaging machines that bundle up finished products. Who knows what the LeBlond's next "fix-it" turning job will be? Today it's dressing down the shaft of a flume return pump. Tomorrow it's finishing a precision bearing where the critical tolerance goes down to tenths!

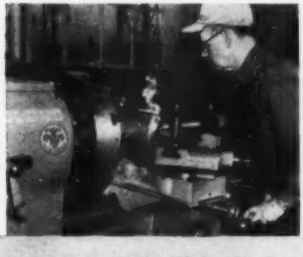
Convenience, low cost, dependability, wide variety of work—that's what LeBlond Lathes mean to maintenance men at U.S. Gypsum. And that's why there's at least one LeBlond Lathe on maintenance work in each of 16 U.S.G. Plants—from Maine to California.

How many of *your* turning jobs did you send out of your plant this month? Is the "other fellow's" profit a large chunk of your maintenance cost?

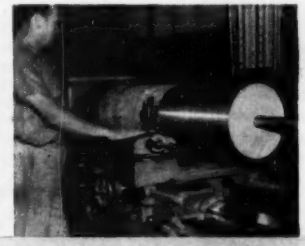
Call your nearby LeBlond Distributor. Show him the variety of turning work that your maintenance requires. Tell him how long it takes to get it done elsewhere, what it costs. From LeBlond's complete line of 76 different lathe models, he can recommend lathes that will handle all of it—or at least a major portion. You'll get the work done sooner, dependably, and without an outsider's profit to pay for.

For complete information contact your LeBlond distributor or write—

THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO



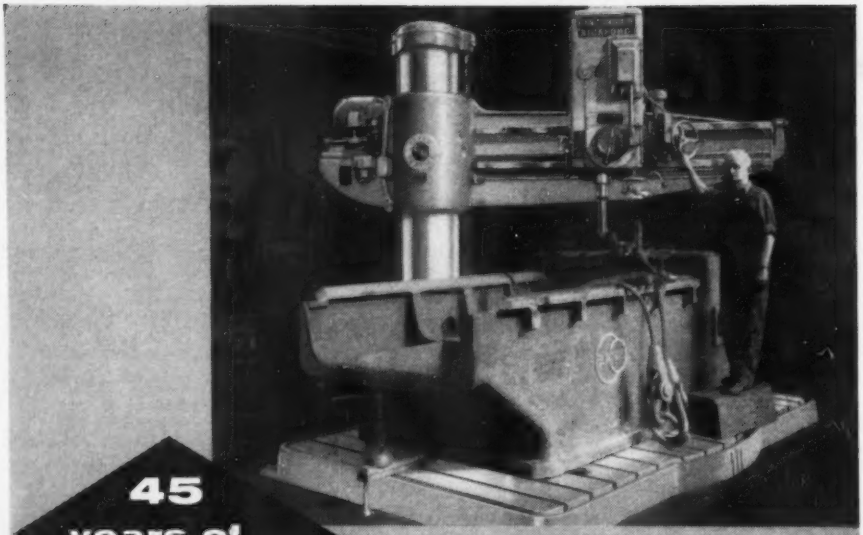
In Alabaster, Mich., LeBlond 24" Regal Lathe threads take-up bolt for 4½ yard Bucyrus-Erie Rock Shovel. Four threads per inch, speed 95 rpm. Plant Engineer, E. John Minderman, says this LeBlond Lathe handles work ranging "from very small parts found in electrical and hydraulic equipment to large gears, shafts and armatures that require the full capacity of the machine". Reports "very dependable service". Ask for Bulletin R-163-A.



In Plaster City, Calif., U.S.G. saves at least seven days by machining this roller on the LeBlond 20" Standard Duty Engine Lathe—right in their own shop. Job used to be sent out, took up to ten days to complete. Another LeBlond Lathe is still in regular use at the Plaster City Plant, after over 25 years of maintenance work. Plant Engineer, R. W. Langewisch, says LeBlond Lathes "save time, expense, increase shop capacity". Ask for Bulletin SD-250-A.

LeBLOND of Cincinnati

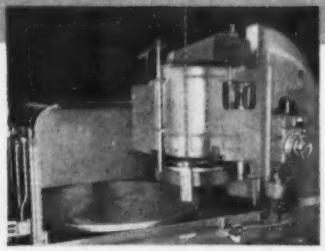
World's largest builder of a Complete Line of Lathes—for More than 66 Years.



45 years of experience speaks

"Well, if you don't buy a Cincinnati Bickford let me keep the one I have."

EMILE BROUILLARD



A close-up of 42-7284 Blanchard Surface Grinder

Photos courtesy of the Blanchard Machine Company, Cambridge 39, Mass.

Extreme accuracy is required in drilling 12 holes in base of large Blanchard Surface Grinders.

Three of these holes are for 3″ x 18″ studs, which provide column adjustment, to required flatness accuracy of .0002″ on an 84″ diameter magnetic chuck. The diameter of the three bores for the column studs are held to + .0005″. Time on these operations was reduced an hour with the installation of this large Cincinnati Bickford Drilling Machine. This operator has not had an accident in 45 years of operating Cincinnati Bickford Super Service Radials. Twelve machines have been installed here, for their safety, production accuracy and general satisfaction.

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Cincinnati 9, Ohio, U.S.A.

AS THE *Editor* SEES IT

New Tax Law and Depreciation

Even the Government appears to be beginning to obsolete and replace some of its museum pieces. One of the most venerable of Government curiosities, depreciation, which has been clattering around like a knight in armor, is having its metalwork lifted. A step in intelligent depreciation has been taken.

Under the old law a piece of equipment could be depreciated only according to one basic regulation. The Treasury Department furnished a guide giving the life of each machine and the rate, and the length of time permitted to depreciate it. Thus, a lathe might have a treasury life of twenty years, while it actually may only have a life of five years before a newer model obsoletes the old one. There thus appeared to be an indirect tax penalty (although not admitted) if a machine were replaced before its treasury life expired. Many businessmen showed a resistance about replacing their machines under this adverse tax situation.

The new law begins with a more realistic approach: it presents a choice of methods to a businessman. (1) He may elect to follow the old system, a straight-line form of depreciation; (2), use the new declining-balance method if it's not in excess of twice the straight-line rate; (3), use any method as long as allowances do not exceed those of the declining balance method.

What is meant by the declining-balance method? Assume a machine costs $10,000 and has a service life of ten years. Under the straight-line method you would depreciate at the rate of 10% per year for ten years. Using the declining-balance method you could use a rate of twice the straight-line rate, or 20% per year. In this case, the first year you would write off $2000, leaving a balance of $8000. The following year you'd write off 20% of $8000, or $1600; leaving a balance of $6400. The next year, $1280; leaving $5120, etc.

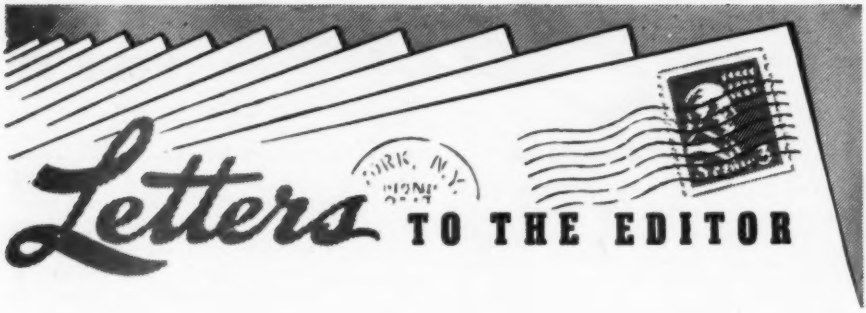
The declining-balance makes possible a quick write-off during the early years of the machine, but the machine is never written off, from now until eternity. To be sure, you may wind up by taking 20% of $.0000000098 one hundred years from now, but you'd still not have the machine written off the books. But who cares, a hundred years from now.

The declining-balance will give a spurt to machine replacement in the first five or six years of the machine's life.

However, one serious flaw of the new law is still this: the Internal Revenue Department determines the useful life of a machine. This has not been changed, and unless something is done about the interpretation of useful life, and until the interpretation is made by men who work with machines with their hands and not by people who think about them at their desks, the new depreciation law falls short of the final goal.

To the many businessmen, political leaders, and associations who gave of their time and effort credit is due for a big beginning step in getting the depreciation phase of the new tax law into the books.

William V. Schleicher



Production Tapping

Please send me a reprint of the article "Trends and New Developments in Production Tapping," by Harry Conn, which was published in the July issue of MACHINE and TOOL BLUE BOOK.

H. V. Townsley, Supervisor
Small Machines Div.
National Automatic Tool Co., Inc.

Please send us 50 copies of the reprint "Trends and New Developments in Production Tapping," by Mr. Harry Conn, as published in the July 1954 issue of MACHINE and TOOL BLUE BOOK.

We have found this extremely interesting and informative and wish to make it available to shop supervisors and our engineering staff.

S. H. Snee, Supt., Production Engineering Section
Westinghouse Air Brake Co.

Reprints sent.

Re: Patent Office

In reading your editorial "Patent Pending," in the July issue, I wish to state that you certainly deserve praise for that editorial. I have been an inventor since 1918; in those days a patent could be secured in less than a year. What really gets me today is the waiting an inventor has to do.

The Government can supply other nations with plenty of money, but the place they should put some of that money is in the patent office so that they can catch up with their tremendous backlog of applications. I have two awaiting action at the present time. It's been over nine months now.

Here is another thing I read recently: There is a bill in the Congress which would raise the final fee for patents. It is not to be like the present fee of $30 but it would be $30 for a five year patent, $60 for a ten year patent, and $100 for a seventeen year patent (like the patent you get today for $30). Can you figure what is going to happen to the free lance inventor? And yet the greatest inventions were invented by men like Edison, Morse, McCormick, Howe, Ford and hundreds of others.

I was well acquainted with the late Major Edward Armstrong of radio fame. He was fighting for bill No. 3534 which would extend the life of patents granted before 1940 where inventors had their inventions stopped by the refusal of the Government to allow metal for such things as cosmetic containers and many other inventions using different wartime materials. This bill was supposed to come up in Congress last January, but what has happened to it nobody seems to know.

I believe the days of the free lance inventor are numbered unless something is done to encourage them.

All the great inventions do not come out of the research laboratories as is evidenced by the men who used their brains to make the United States what it is today.

Wm. G. Thompson
Clinton, Mass.

American Built Machine Tools

We have seen your advertisement regarding the second volume of American Built Machine Tools in which Grinders are listed. Will you please advise whether or not Disc Grinders are shown in this volume?

S. M. Napp, Vice President, Eng.
Besly-Welles Corp.

Yes, Disc Grinders are included in volume 2. To reader Napp a complimentary copy because it contains a fine article written by him.

Information Please

I am interested in locating a manufacturer of a profile grinder. This machine would grind flat or circular tools with intricate conteurs for the woodworking industry, primarily for moulders, shapers, etc.

There is one presently being manufactured which is called Optical Projection Profile Grinder, but I have been unable to locate the company by whom it is manufactured. This machine uses a comparator with a 50-1 profile enlargement of the tool and specification chart.

If you know of the manufacturer of this or any other grinder of similar nature, I will appreciate hearing from you. Please submit a bill if there is any charge for this information.

A. E. Jones
Old Forge, Pa.

Information has been forwarded. No charge. 'Twas a pleasure to help.

Jet Power

I am a subscriber to your magazine and my January Jet Issue was lost through "loaning."

I am very interested in obtaining another copy as I am becoming involved in jet engine work in our plant.

Jack Nemeth
Lakewood, Calif.

We have on hand, one very worn copy of: MACHINE and TOOL BLUE BOOK, Jet Power Issue, January 1954.

We would appreciate receiving one new copy of this issue for our Technical Library.

Please submit charges so that we may remit.

Elizabeth H. Kirchhof, Librarian
Universal-Cyclops Steel Corp.

Copies sent. No charge. When these become "loaned" or dog-eared write us again; we'll send more.

Time Study

Will you kindly send us a reprint or tear sheet copy of the article "How to Make Your Time Study Standards More Accurate," which appeared in the March issue on page 200.

M. Constance Parché, Librarian
The Carborundum Company

A tear sheet has been sent. The attention of readers is directed toward the current series on time study now appearing in the BLUE BOOK. Part 1 began in August, part 2 is in this issue. If you have any questions regarding time study fill out the questionnaire accompanying the article.

Just finished reading the splendid article by Mr. Harold Nissley on Time Study, in the August issue. While there have been a number of time study articles and books, all seem to have been written by professors or theorists. I like Mr. Nissley's obviously professional approach. I hope the rest of the series is as good as the first article.

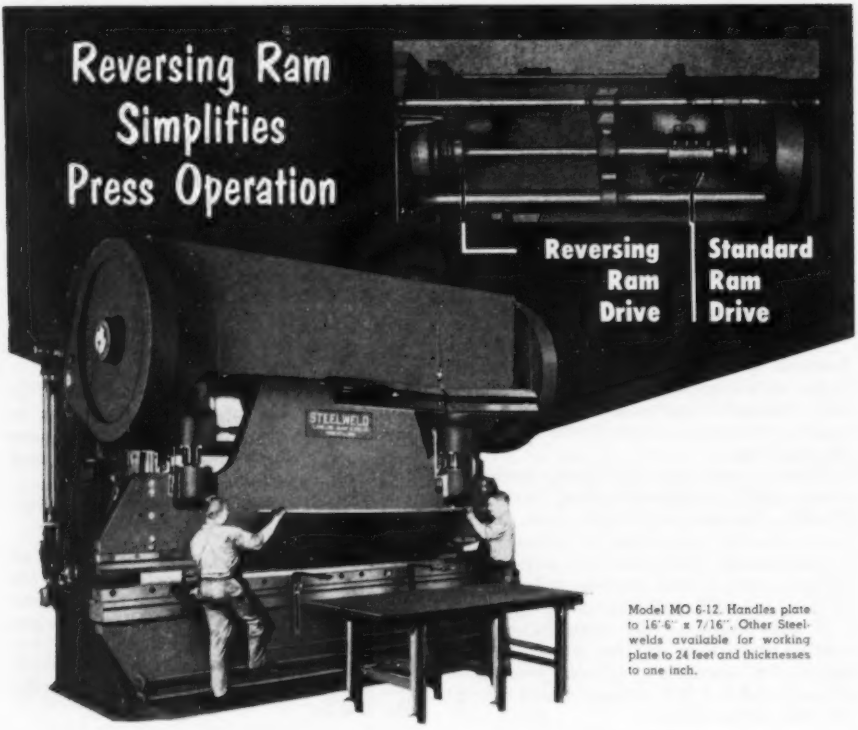
I have checked a number of questions that I'd like to have answered.

George Bisbe, Industrial Eng.
Philadelphia, Pa.

Don't Overlook . . .

part 2 of the series on Time Study by Harold Nissley. Part 1 appeared in August. If you have any questions you'd like answered regarding time study fill out the questionnaire and mail it to: Editor, MACHINE and TOOL BLUE BOOK, Wheaton, Ill. You'll find the questionnaire at the end of part 2.

Reversing Ram Simplifies Press Operation



Model MO 6-12. Handles plate to 16'-6" x 7/16". Other Steelwelds available for working plate to 24 feet and thicknesses to one inch.

With a reversing ram drive you can back the ram or upper die away from the work at any point in the stroke. It is not necessary for the ram to continue through in one direction as when only the normal press drive is provided.

This feature speeds locating the correct ram position to achieve a specified bend or shape. It saves time and spoilage when trying new dies.

Reversing ram machines have two complete drives, including motor, flywheel, clutch and brake. They are controlled by individual foot pedals on two different shafts, located one above the other across the front of the press.

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How's BUSINESS ?

1954 . . . Second Best in History

WASHINGTON . . . A check of basic economic indicators shows that the year is likely to be the second best in history—surpassed only by 1953. The 1954 unemployment figure is 5% of the labor force, the same percentage as in 1950.

Perhaps the most important factor in the economic picture is the highly favorable long-range outlook. The nation is being transformed by the strong upsurge in population and by the unprecedented development of new products, new raw materials, and new uses of other raw materials.

WASHINGTON . . . The Federal Reserve Board policy of keeping adequate funds in the banking system to finance business expansion, while at the same time avoiding the pumping in of excessive funds which cause inflation has brought about what looks like the end of the dollar's decline in value.

From May of 1953 to May of this year, the cost of living index rose only two points—from 113 to 115—which is another way of saying that the purchasing power of the dollar has almost stopped skidding.

June Installment Buying up $178 Million from May

WASHINGTON . . . Installment buying of automobiles, home appliances, etc., advanced $178 million in June from the previous month, the Federal Reserve Board reports.

That installment buying is returning to normal, is indicated through a comparison of this advancement with the greater gains of $422 million for June, 1953, and $732 million for June, 1952.

Commercial Exports First Half of 1954 Over 1953 Period

WASHINGTON . . . The Commerce Dept. has reported that commercial exports during the first half of 1954 climbed 6% above the same period of 1953. Approximately $6,341,000,000 was the total for the 1954 period. June commercial exports amounted to $1,113,000,000. This was an increase of 10% over June, '53, but a decrease of 1.7% from May, '54.

Import estimates showed the U. S. bought goods amounting to $5,218,000,000 from January through June. This was down from the same period last year, when imports totaled $5,663,000,000. $965 million in goods were imported in June, 16% above May's $829 million and an increase of 3% from the $933 million bought in June, '53.

WASHINGTON . . . The Federal Reserve Board's recent cut in bank reserve requirements will make it easier to get money for business purposes.

The move added about $8 billion to the lending power of banks. This should stimulate business expansion, inventory purchasing, consumer sales, home buying, and local public works construction.

A similar action in 1953 which added $5.7 billion credit potential brings the

lending power added within a year to a total of $14 billion. Banks with idle funds already on hand aren't cheered by this development. The downward pressure on interest rates will increase. But officials of the Federal Reserve Board think business, which is just beginning to turn up, needs a shot in the arm to send it on its way.

WASHINGTON . . . The Chamber of Commerce expects to lay before President Eisenhower and the state governors late this year, a comprehensive recommendation for street and highway improvements throughout the nation.

The recommendations will place particular emphasis on President Eisenhower's $50 billion national highway improvement program announced at the Governors' Conference at Lake George, N.Y., on July 12.

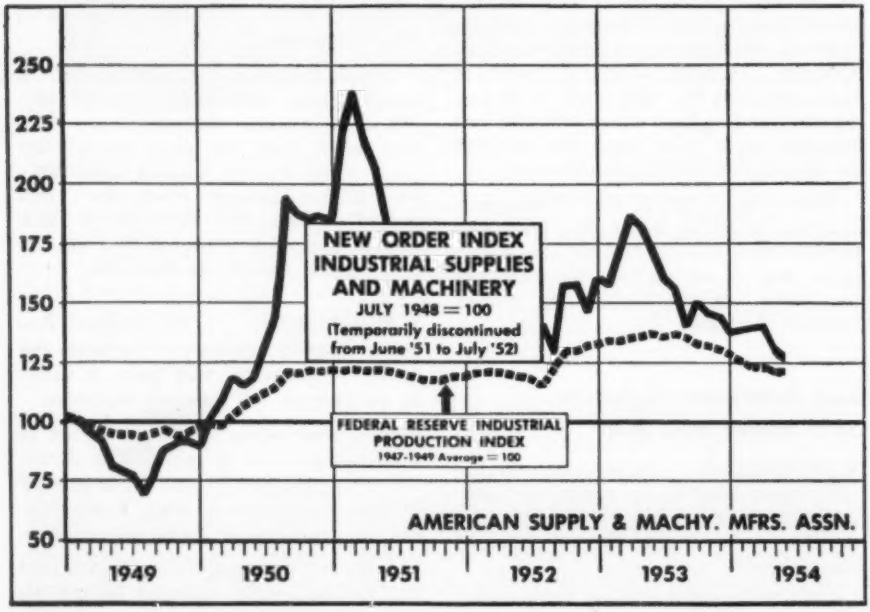
During October and November, experts for the National Chamber will survey urban problems in six pilot plant cities: Worcester, Mass.; Dayton, Ohio; Sacramento, Calif.; Columbus, Ga.; Birmingham, Ala., and Houston, Texas.

CHICAGO . . . September 7 has been set as the opening date of trading in scrap steel futures at the Chicago Mercantile Exchange.

New contracts, approved by the Board of Governors, require a unit of 40 gross tons of No. 1 heavy melting steel. As a substitute, No. 2 heavy melting steel might be delivered at a discount of $5 a ton. Variation in quantity must be kept at a maximum of 10% over or under that called for by the contracts.

Price fluctuations will be a minimum of 12½ cents a ton or $5 a contract. Non-members of the exchange must pay $18 a contract for a round turn transaction.

January and March have been given



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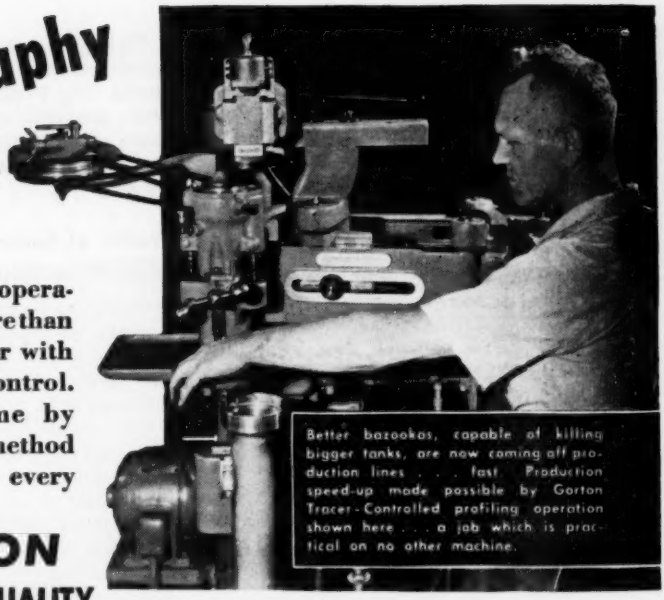

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PRODUCTION DATA—

JOB: Profile 6 locking lugs for male and female sections of new 3.5" Bazooka

MATERIAL: Aluminum alloy

CUTTER: 5/32" dia. single flute, fast spiral H.S. steel running at 3,900 R.P.M., without coolant

MASTER: 2 masters: one for male and one for female sections; 3 times oversize, traced manually

HOLDING FIXTURE: Pneumatic-operated internal expanding type

APPROX. TIME: 36 pieces per hour

ALTERNATE METHODS: None practical

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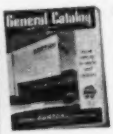

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as delivery months for contracts to be initially traded. Memberships to individuals in the scrap steel industry are available only from existing members who wish to sell.

WASHINGTON . . . "We seem to have already passed the extreme depth of what might be called the best publicized minor recession in American history," said Clem D. Johnston, National Chamber president, recently.

"The Chamber of Commerce of the United States believes that, generally speaking, business in the remainder of 1954 will be good by any standards established prior to 1950, even though it may not surpass the all-time record year of 1953," Johnson added.

A Look at Government Aids for Economic Stability

Business has profited in several ways from decisions handed down by the present administration.

Perhaps the biggest boost has come from the monetary policy of the Federal Reserve Board, carried out with the cooperation of the U. S. Treasury. With almost perfect timing, this policy has maintained the economic theory that money should become increasingly harder to obtain as business rises, and should be readily available when needed to pull business out of a nose-dive.

Reduction in taxes has also done its share to keep businessmen smiling. Uncle Sam's annual take has been reduced by about $7 billion.

The stockpiling of metals against future war emergencies must also be counted a business-boosting measure, as might the attempt to open mercury mines that have been closed.

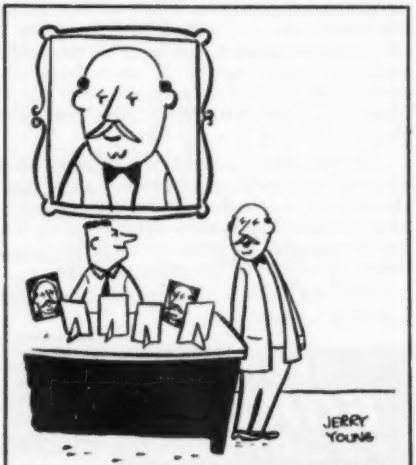
Speed-ups in government spending, while not increasing the spending, do help to get the money out sooner. An allotment of $875 million to the states for highway development on July 1 advanced the usual date of the fund's availability by six months.

The government apparently still hasn't reached the bottom of its bag of tricks. The President's $50 billion highway proposal and the possibility of more tax cuts may mean further nudges for business should it show signs of lagging.

Profits of Current Period May Be Down from Third Quarter 1953

Corporate profits of the current quarter will not quite equal those of the like period of 1953, it is believed. The second period, however, was nearly matched with that of last year.

One major factor in this prediction is the present state of the steel industry, whose production is now running well below the second quarter level. The auto industry expects the third quarter 1954 figures to be down from the same period of last year. Auto production is almost sure to fall well below the total of 1.6 million cars built in the July-September quarter of 1953 because model changeovers will be much more extensive than last year, when only



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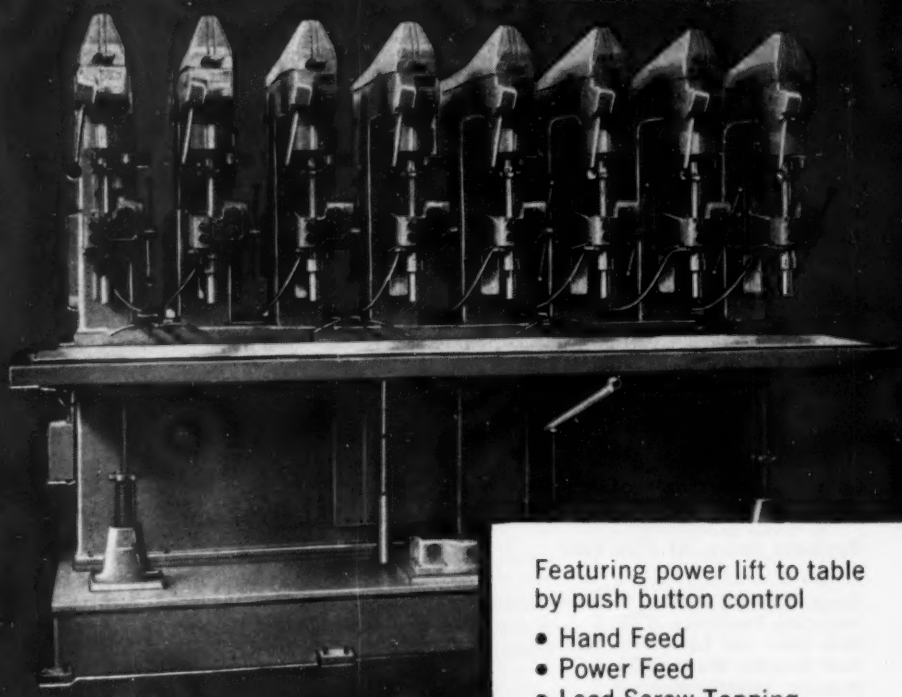

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Cadillac, Buick, and Oldsmobile changed their body styles completely.

Recent price reductions, cutbacks in refinery runs and reductions by state regulatory agencies in allowable crude oil output are expected to lower earnings in the oil industry.

As good or better than last year net results are looked for in the following industries: aircraft makers, chemicals, movies and movie theaters, textiles, and railroads.

Fourth Quarter Metal Rations Down 7% to 15%

WASHINGTON . . . Steel, copper and aluminum rations for military and atomic producers will drop in the fourth quarter to from 7% to 15% below this present period.

The 651,000-ton steel allotment will be off 12%; copper and copper base alloy products will total 72 million pounds, a reduction of 15%, and aluminum will be 7% less than the third quarter, or 107 million pounds.

The Office of Defense Mobilization grants for the fourth quarter are the lowest yet under the Defense Materials System, which was inaugurated July 1, 1953. In the third quarter of 1953, the first quarter of D.M.S. operation, steel allowances amounted to almost four times as much as those of fourth quarter 1954. Copper allotments are only 29% of third quarter 1953 levels and fourth quarter aluminum grants are 47% of the July-August-September period of 1953.

The decline in metal requirements resulted from a general tapering-off of military production programs, according to O.D.M. officials.

Business and Defense Services Administration said recently that a total of 127 million pounds of aluminum will be set aside for defense manufacturers in the last quarter of 1954. This aluminum will be retained at mill level. This amount is 20 million pounds more than O.D.M.'s allotment for the fourth quarter because it includes aluminum for producers of civilian-type items which will be used in the military hardware being manufactured by principal defense contractors.

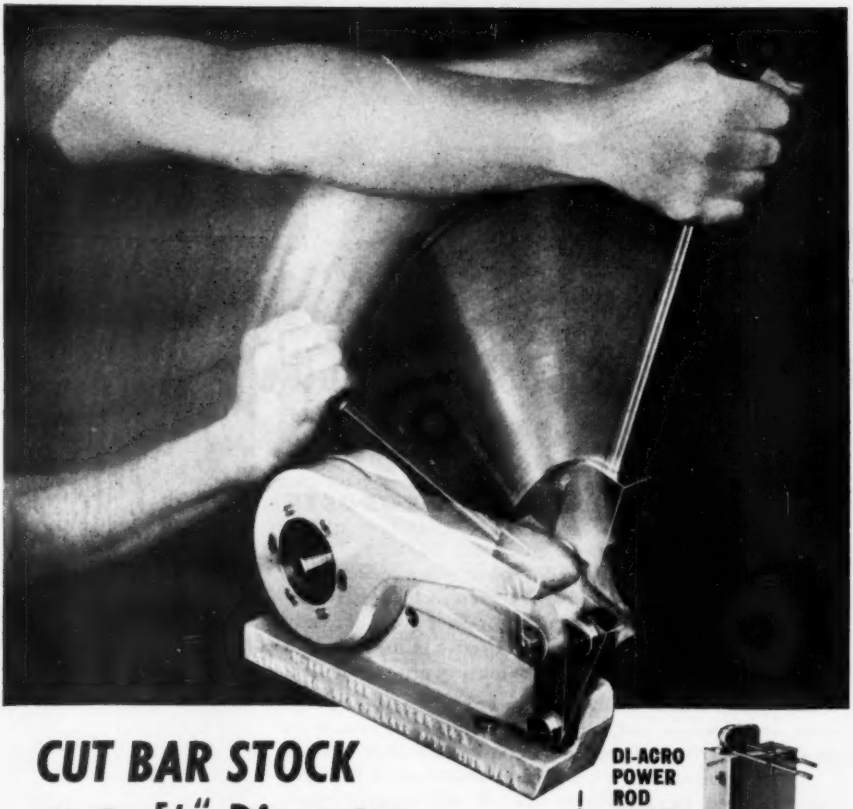
The B.D.S.A. announced that additional amounts of steel and copper will be reserved at the mill level for indirect military users, but declined to state what they will be.

WASHINGTON . . . In its first general crop report for 1954, the Agriculture Department estimated that the overall harvest would be the nation's fourth largest.

Business Score At Mid-Year

	1950	1952	1953	1954*
Gross National Product (billions)	$287.0	$348.0	$367.2	$356.0
Industrial Production (FRB)	112	124	134	124
New Plant and Equipment (billions)	20.6	26.5	28.4	26.8
New Housing Starts (millions)	1.4	1.1	1.1	1.0
National Income (billions)	241.0	292.0	306.0	299.5
Compensation of Employees (billions)	153.0	193.0	207.6	204.0
Corporate Profits Net (billions)	22.7	18.6	19.0	18.5
Disposable Personal Income (billions)	206.0	235.0	248.0	249.3
Money Supply (billions)	176.9	194.8	201.3	198.0
Farm Income, monthly average (billions)	2,384.0	2,721.0	2,599.0	1,962.0
Consumer Prices (1947-49=100)	102.4	113.5	114.7	115.0
Wholesale Prices (1947-49=100)	103.1	111.6	110.1	110.0

(*Annual rate, based on data through June.)



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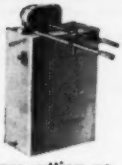

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LAST MINUTE WASHINGTON NEWS

★★★

by Arnold Kruckman

Washington Correspondent

There is in the Senate a small group of persons who are intense, and whose interest has infinitely less concern with the immediate object of a filibuster than the philosophy of the act of filibustering. They feel the United States Senate is the last great deliberative body in the world whose right to speak and to speech, should not be abridged except under its own age-old parliamentary rules. There is nothing in these rules which can stop a senator from speaking as long as he pleases. On the face of the thing it would seem to be an extremely silly regulation but actually it does protect the freedom of speech in the U. S. Senate, and for that reason, even with its apparent deficiencies it has the sincere support of even those who recognize the absurdities of such a proceeding as the recent filibuster.

It may interest you to know that the leader of the group, which always keeps alert to any trespass upon the Senate's right of free speech, is George Washington Malone, the junior senator from Nevada. Long before he went into the Senate it was a matter of utter faith with him that the right to unrestricted speech, under parliamentary rule, must be preserved in the U. S. Senate if the right to free speech is to survive in any great parliamentary body of the world. You may not always hear Malone's name in connection with the filibusters, but so long as he is in the Senate you may make up your mind that it is the alertness of Malone, and some of the small group with whom he is associated, which guards against the adoption of cloture. They feel if the U. S.Senate at any time adopts cloture, the last stronghold of free speech in America and in the world will be wiped out.

It should be explained that the House is under far more rigid control, and its proceedings can be limited practically to anything they may have in their minds by the rules committee, or the majority leaders of the House. The men in the Senate who make such extraordinary defense against cloture realize that the filibuster is often used in a manner that irks the voters. It has been the earnest determination of the group which fights for the right of free speech, composed of members of both parties, to find some manner to take the absurdity out

of the filibuster, to prevent its misuse, to protect the voters against the very sort of thing that has recently happened; but thus far they have not been able to find the parliamentary answer.

This explanation is given with the idea that there is every possibility that some of the business men who read this may be able to aid the senators who are seeking the solution to the problems of the filibuster without the need to invoke cloture. The advice of thoughtful business people will be earnestly welcome. Suggestions might go to the friends of business people themselves in the Senate, or to Senator George W. Malone, U. S. Senate Office Building, Washington 25, D. C.

All this has bearing, of course, on revision of the tax law, or the new Internal Revenue Code of 1954, which was recently processed out of the Congress. There was apprehension among the very earnest group in the Senate that the rush, which is an inevitable result of the filibuster, had the effect of the legislative jamb, and was used by lobbyists, by special pleaders in the House and in the Senate, by the party leaders, and by the Administration itself, to slip through all kinds of undesirable legislation. There were groups in the Senate and in the House, and groups that have nothing to do with the Senate and the House, watching this possibility with every facility at their command.

Some idea of the work that has been done on the tax revision bill may be gathered from the fact that the close-printed small type reports which were issued by the Senate and the House covered more than 5000 pages; and that final Conference Report,which came out on July 26, and which was supposed to be the ultimate boiling down of the agreement of the Senate and the House, covered over 100 closely printed fine-type pages. These Conference Reports, incidentally, are, in effect, the agreement between the two parts of Congress in regard to debatable phases of the proposed law that they discussed in the two Houses for such a long period of time. It is doubtful whether the average businessman, even those who are familiar with the proceedings in Washington, clearly understand the importance of the Conference Committee's sonsiderations, and the final report. Very often the entire law upon which members of both Houses have worked earnestly and industriously, is changed in many important details by the Conference Committee. It is also one of the customs of the Congress that Conference Reports very rarely are declined for acceptance by either House.

The Conference Report on the general tax revision bill had these changes from the text of the original bill as passed by the House and the Senate: (a) the 52% corporate rate is extended unitl next April first, (b) the accelerated depreciation is permitted for assets having a service life of at least three years if construction is completed and put into use after December 31, 1953, or if any portion is complete after that date. The new code, as provided in the Committee's report, permits the tax payer to switch from the declining-balance to

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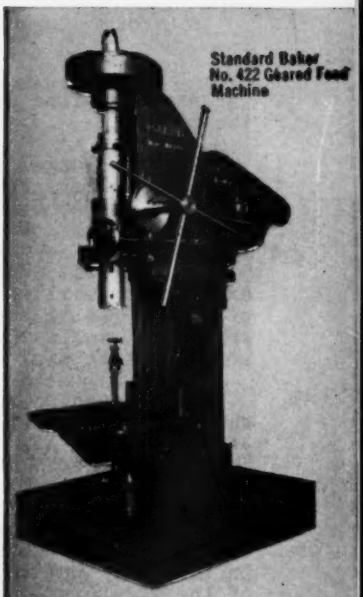
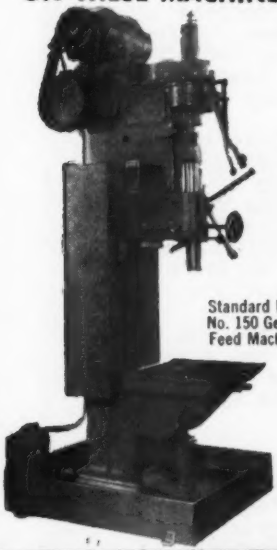


Standard Baker No. 422 Geared Feed Machine



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3. Distance center of Spindle to Frame (Gap)*	11"	11"	12¼"	12¼"	12¼"
4. Maximum Spindle Travel	11"	11"	12"	16"	16"
5. Spindle—Outside Dia. splined driving end	1¼"	1¼"	2"	2-13/16"	3¼"
6. Dia. of Spindle Sleeve	2¼"	2.750"	3¼"	4¼"	5¼"
7. Dia. of Spindle Nose	2.975	2.975"	.3225	4.225"	5.225
8. Morse Taper in Spindle as standard	No. 4	No. 4	No. 5	No. 5	No. 6
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the straight-line depreciation at any time during the life of the property.

Other changes reported by the Committee provide that partnerships or proprietorships of a certain size may elect to be taxed as corporations; it also provides that the net operating loss carryback is extended from one to two years making an eight-year operating period for absorbing losses. Research and development expenditures may be deducted either as a current expense or amortized over a longer period. An earnings credit of $60,000 is allowed under the revised surplus accumulation provisions while the penalty tax is to apply only to that portion of retaining earnings deemed unreasonable.

The speed-up in corporate tax payments for corporations whose annual tax liability is $100,000, or greater, beginning after December 31, 1954, and a dividend credit of $50 plus an additional credit of 4%, up to a limit of 2% of taxable income, is allowed in 1954, and 4% will be lawful in later years.

The revised tax code will cut another $1.4 billion, and increase the aggregate of tax relief, in 1954, to $7.1 billion. On the Hill they tell you that the tax philosophy of Secretary of the Treasury George M. Humphrey prevails in the revision. Humphrey, as is well known, is a sincere and enthusiastic internationalist. The chief emphasis of the new tax code is on relief for business and industry. Those who worked on it had in mind to expand production and to create new jobs.

Students of taxation will tell you this is the end of a quarter century policy. The system of the past was a residue of the 'thirties and 'forties, the period of the depression and total war. The new code is made to adapt our tax system to the needs of the 'fifties and 'sixties.

It was in 1936 that dividends were made fully taxable under both individual income and corporate profit tax. Tax penalties were part of the the rentention of earnings by corporations. In recent decades considerable production capacity was idle. With World War II the Government piled on top of this tax structure a set of rates making small anything previously known in this country. The demand for reform in taxes has been active ever since the end of World War II. Some of the cuts in 1946 and 1948 had to be restored to finance the Post-Korean build-up. Recently the excess profit tax was wiped out and the income tax treatment of married couples made uniform by income-splitting in all states. It was provided that businesses might carry operating losses of a period of five years.

It is estimated the new code removes tax obstacles, and makes other changes which total almost 4000 new details. Under previous law the net income of a business has been calculated by deducting from receipts for the decline in the value of the capital assets, resulting from time, wear and tear, obsolescense, and all other depreciation. Apparently the old law strictly limited the rate at which these depreciation

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STYLE OF BUSH Steel Shoulder

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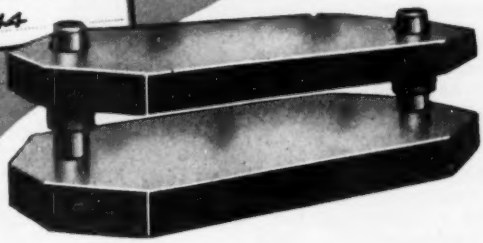

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CLEVELAND	TO 1-0860	MILWAUKEE	GL 3-7170	ST. LOUIS	PR 6811
DALLAS	TE 5029	MINNEAPOLIS	OR 5-7980	SEATTLE	EL 6444
DAYTON	HE 3042	MONTREAL, CAN.	GL 4126	TOLEDO	MA 4510
DECATUR, ILL.	8-3474	NASHVILLE	6-2597	TORONTO, CAN.	KE 2972
DENVER	SH 2431			WASHINGTON, D.C.	AD 4-5760

charges may be made. The depreciation allowed early in the life of an asset often is much less than the actual or probable decline in its value.

In the discussions in the committee of the House and the Senate, as revealed in the voluminous records, it was brought out that this situation has a number of serious consequences. Businesses naturally are reluctant to replace existing equipment while it still has a large value not yet written off. Smaller businesses, also, take the risk that the new equipment will lose its value as a source of income before all allowable depreciation has taken place. It was found that under the old law (under the old understatement of depreciation) the result was an over-statement of income and therefore of tax. Under the law as it has existed, business was required to pay part of its taxes earlier than they would have been due if depreciation had been more reasonably calculated. This naturally reduces the fund available for a business to invest in the expansion that provides more jobs.

Senator Milliken (R., Colo.), Chairman, Senate Committee on Finance, brought out in his report on the new law the basic provisions that liberalize depreciation allowances, primarily through the extension of the use of the declining-balance method at double the corresponding straight-line rate, applicable to new property acquired on constructed after December 31, 1953. The Senator reported: "Depreciation allowances computed under any one of the following methods are to be considered reasonable for new property acquired or constructed after December 31, 1953.

"1) The straight-line method allowable under present law.

"2) The declining-balance method, using a rate not in excess of twice the straight-line rate. Under this method a uniform percentage is applied to the unrecovered basis of the property. Since the basis of a particular property is constantly reduced by prior depreciation, the percentage is applied to a constantly declining balance. The depreciation allowances under this method, therefore, are considerably larger in the early years of the life of a property than those resulting from the straight-line method. The declining-balance method depreciates 40% of the cost of an asset in the first quarter of its service life and two-thirds of the cost in the first half of its life.

"3) Any method consistantly applied so long as the accumulated depreciation allowances for a property at the end of each year do not exceed the allowances which would have resulted from the use of the declining-balance method described above. Alternative methods which would be considered reasonable would include those based on units of production or a combination of straight-line rates."

The more liberal depreciation methods in the new law apply to all types of tangible depreciable assets, including machinery, industrial and commercial buildings, all industrial machinery and equipment, farm equipment, buildings and rental

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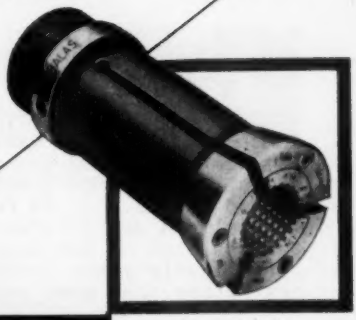

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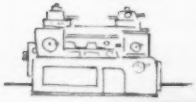

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housing. Senator Milliken emphasizes that it must be understood the methods are limited to property now in use and therefore never before subject to depreciation allowances.

He says this limitation will minimize transitional revenue losses and make for maximum incentive effects. He points out application of the new methods to used property might artificially encourage transfers and exchanges of partially depreciated assets. It is felt the stimulus to investment through liberalized depreciation is extremely important as a motive for the creation of new assets. The reality of faster depreciation in the early years is generally far greater in the case of new rather than used property.

He points out the faster tax write-off will increase available working capital and materially aid growing businesses in financing expansion. The Senator suggests smaller business particularly has a vital stake in a more liberal depreciation policy. It is especially dependent on current earnings or short-term loans to obtain funds for expansion. He holds faster recovery of capital investment under this law will permit short-term loans which would otherwise not be available.

The law provides when the taxpayer and the Internal Revenue Service have agreed in writing to a rate of depreciation, that rate will continue to be appropriate until such time as evidence is produced which was not taken into consideration when the agreement was made. The burden of providing the evidence will rest with the party initiating the change in rate.

The senator points out a characteristic feature of the declining-balance method is that it leaves an unrecovered portion of from 10% to 13% of cost at the end of service life. Where the asset is a single item, the amount unrecovered may be deducted as a loss when the asset is sold or abandoned. With a group of items in mind, such as machines, if a taxpayer maintains a record of his depreciable assets by year of acquisition, he may deduct the entire remaining unrecovered cost of a given year's acquisition at the time of retirement of the last surviving unit. If the taxpayer does not avail himself of this procedure he would recover the 10% to 13% gradually over a long period of years subsequent to the end of the service life.

The "10% leeway" rule, which was protested by many taxpayers, has been eliminated. Congress felt that it might be a substantial source of misunderstanding and distortion, and that it would not interfere with the flexibility of the administrative policy of the Internal Revenue Service. The new law also would permit use of different depreciation methods appropriate to different classes of assets. The new method will not apply only to that portion of costs incurred subsequent to 1953; the amendment will permit the entire cost construction to be depreciated under the new methods if completed and first put into use after December 31, 1953.

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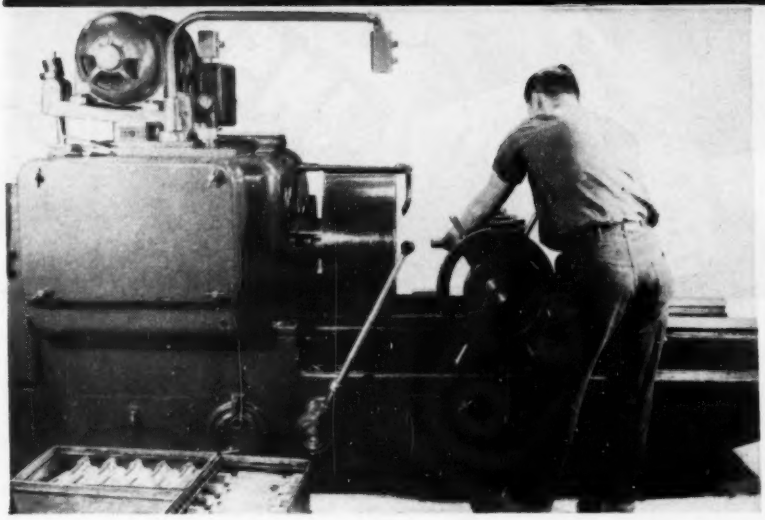

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Turning Titanium Jet Compressor Discs

By **John L. Elliott**
Process Engineer
Tracer Control Co.
Hazel Park, Mich.

THIS REPORT is based on experience in the successful machining, on an experimental level, of titanium compressor discs for jet aircraft engines. Facilities and available time did not permit exhaustive research; nevertheless, much was learned.

The material was TI-150 Alloy furnished by the Titanium Metals Corporation in the form of forgings with the skin removed by rough turning.

Our dimensions, as required on various discs, varied as follows: O.D.'s from 17.0" to 18.7"; hub thicknesses from 1.0" to 1.6"; flange thickness at the O.D. being .134" in all cases.

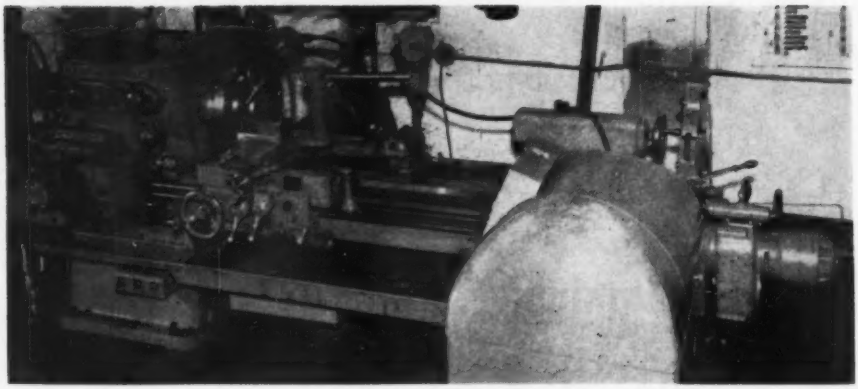
Required finish was 80 microinch, except for the hub faces and the bore which were 32 and 20 microinch respectively. No trouble was experienced in producing these finishes when the cutting tool was properly dressed. When warpage was not evident it was not difficult to duplicate the contour of the template within .0005".

The lathe used for all operations except preliminary trepanning was a Lodge & Shipley Model X, 16" Heavy Duty Toolmaker lathe.

In order to turn the contoured faces, tracer control of the cutting tool was achieved through the use of the Tracer Control Duplimatic in conjunction with the above lathe.

On O.D. and contour turning, roughing cuts were, in general, .125" deep at a cutting speed of 155 surface fpm maximum; the feed was .0075".

Finish cuts were, in general, .005" deep at a cutting speed of 230 fpm with a feed of .0035". The lightness of this cut was necessitated by the flexibility of the piece and the accompanying



Tracer control of the cutting tool was achieved through the use of the Tracer Control Duplimatic in conjunction with a Lodge & Shipley Model X, 16" Heavy Duty Toolmaker lathe. Console of the Duplimatic appears in foreground.

tendency to warp in the finishing stages.

Our spindle speeds were constant. It would be definitely desirable to have the spindle speed increase as the diameter of cut is reduced in such a way as to keep the surface fpm constant. One way of doing this is with a DC drive and electronic control.

Tooling

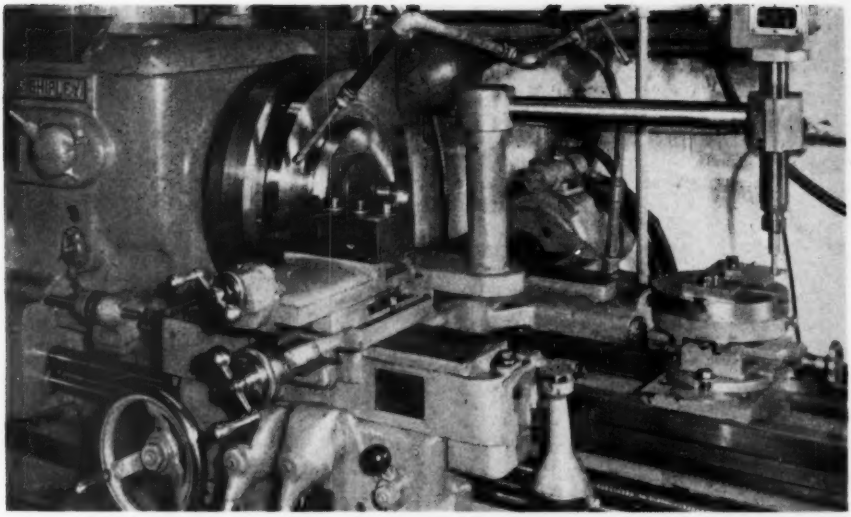
a. Fixture

Only one fixture was used for turning contours on both sides of the piece, hub facing, boring, and checking. Walter Hanba, of this company, made the basic design and modifications were made as the work progressed. The fixture consisted of a base plate, recessed to locate on the O.D. of the face plate of the lathe. Tapped holes received 24 jack screws to support the flange of the disc while contour turning. We had originally used only 6 jacks, found it necessary to use 12, and finally, in the finishing stages, 24 jacks were used in order to maintain the flatness and thickness of the flange within specified limits. A central hole located a hardened and ground, removable mandrel with a flange to act as a pad for clamping the hub of the piece. This flange was doweled and anchored with cap screws to the base plate as it also acted as a friction driver of the piece when O.D. and contour turning. When in use, concentric adaptor rings were, in turn, mounted on the mandrel and anchored with cap screws. These rings were hardened, and ground to O.D.'s acceptable to the various rough and finish I.D.'s of the different discs. Lastly, there was a clamping plate, a washer, and a nut to clamp the piece to the driving flange of the mandrel.

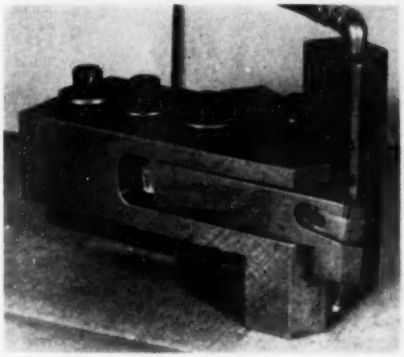
On the O.D. were slots and holes to receive and anchor six flange clamps, L-shaped for the boring and hub facing operations. Clamping screws in these were on a common centerline with opposing jack screws to avoid warping the flange of the piece through the pressure of clamping. Incidentally, the jacks were slightly unevenly spaced, radially, to discourage vibration.

b. Contour checking gage

This gage was a flat, banjo-shaped plate with a locating boss received by a central recess in the mandrel. Holes



No supporting jacks were necessary for the first roughing cut of the contoured face. Coolant was fed to the cutting tool through a manifold. (This photo was taken previous to this improvement. See photo below of the manifold.)



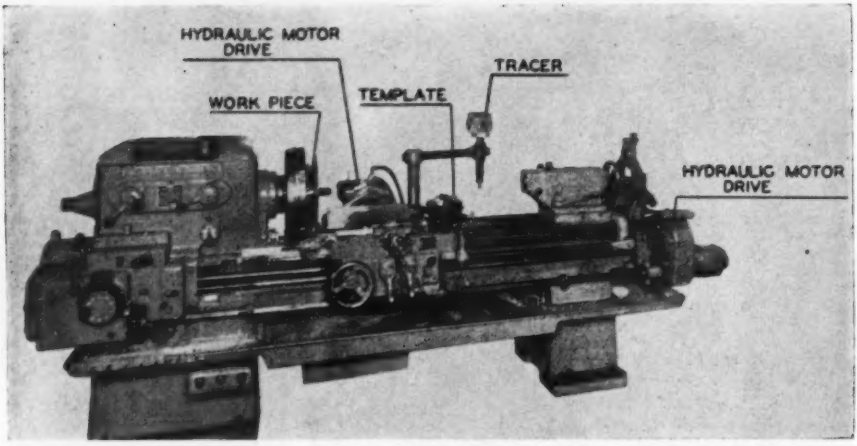
The tool block anchored to the tee-slot of the compound and extended toward the work an approximate 1.5". Note the orifices in the coolant manifold. Centerlines of each opening radiate from cutting edge.

on a radial line, bushed to receive depth mikes, were spaced to print checkpoint dimensions. Depth mike rods were ground to an approximate 60 degree point because the contour being checked was in most cases an off-square surface.

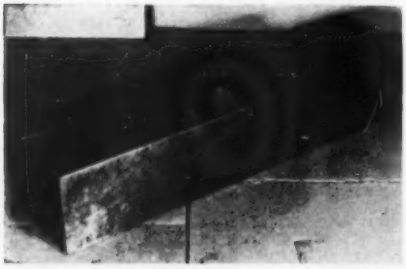
c. Cutting tools

Cutting tools used were Wesson solid triangular carbide inserts in the Wesson Multicut holder. The GI grade was used for roughing and finishing. Some finishing was done with the GF grade but difficulty was experienced in grinding as our facilities are limited and this material is brittle and shatters easily. It was felt here that positive rake was more effective for both roughing and finishing but again limited facilities discouraged much experimentation, and a 5 degree negative rake was used for the bulk of the turning.

We ground our tools with two grades of silicon carbide wheel, finishing with



For boring and hub facing the compound slide was replaced with a tee-slotted extension, designed to mount the tool post or boring bar holder in a position much closer to the work than was normally possible because of the limited swing over the saddle. (See photo of extension below.)



A tee-slotted extension replaced the compound slide for boring and hub-facing operations. Its function was to get the tool closer to the work.

a Waltham GC-120-HV. The cutting edge was then honed with a diamond dust impregnated cast iron block. This was done by hand. This step vastly improved grind-to-grind time.

The tool holder was mounted in a rigid tool block which mounted on the compound and anchored to the tee-slot extending towards the work an approximate 1.5". The tool block was so designed as to provide two tool positions and also to get the tool closer to the work than was normally possible with this lathe because of the limited swing over the carriage with this extreme diameter being turned.

d. Coolant

Soluble oil in water at 1-10 ratio was used as a coolant. This ratio did not seem critical as we had been informed it would be in titanium machining. The coolant was fed to the cutting tool through two ⅛" dia. orifices in a manifold located as closely as was possible to the cutting tool. The center-lines of these orifices were also radial from the cutting edge of the tool providing two simultaneous jets of coolant at different angles. The manifold was mounted on the tool block using screws through elongated holes to provide a convenient method of adjusting the coolant stream placement by simply

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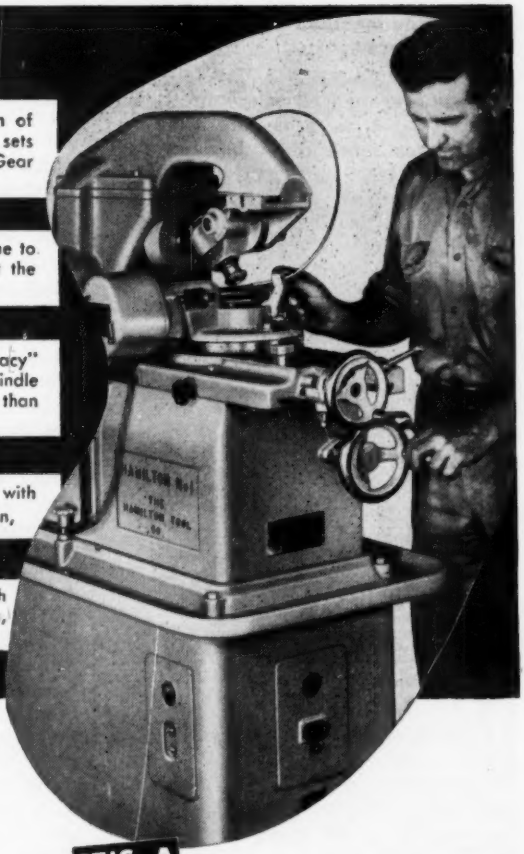

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loosening these screws, moving the manifold, and tightening the screws again. This was quite successful but could possibly be improved through the addition of one or two orifices. We had previously tried shooting a stream of coolant from below the tool to the point of separation of the metal but this proved unsuccessful because of chips blocking the flow. The development of the manifold came as a natural result of previous chip trouble with nozzles.

Chips also made fruitless an attempt to use CO-2 as a coolant. The gas orifice was more often blocked than not or at least sufficiently to deflect the gas jet from its useful path. The nozzle was also badly mutilated by traveling chips.

Machining

The following steps cover the machining of the disc from forging to finish.

1. Trepanning
2. Rough bore
3. Rough turn contour & face hub
4. Stress relief
5. Bore, face, turn contour
6. Stress relief
7. Rough mill slots (if required)
8. Stress relief
9. Bore, face, turn contour
10. Stress relief
11. Finish cut on bore, face and contour
12. Finish milling

Trepanning the original hole of an approximate 9.5" dia. was done with the work held in a three-jaw universal chuck on a larger lathe by plunge cutting with a high speed tool ⅜" wide by 1½" thick with side clearance appropriate to the radii of the cut. A feed of .055" was used at 30 fpm. To permit the use of a short, rigid tool the cut was plunged to the half-way mark from one side and finished from the opposite side. At this same setup the hole was finish bored to receive the adaptor ring for that particular disc.

The piece was then mounted on the fixture. O.D. and contoured faces were rough turned in ⅛" deep cuts, leaving .100" per side for finishing. No supporting jacks were necessary for roughing the first side but six were required for the second side. The piece was then stress-relieved for the first time. Following stress relief and inspection the piece was rebored if necessary. For this step the six flange clamps were brought into play to clamp the flange to the opposing jack screws for location and driving. Line-up in an average plane parallel to the base plate and centrally was accomplished by snugging up the clamps and tapping the piece while checking with an indicator. The mandrel was removed previous to this operation. For hub facing the mandrel is used for location, supporting jacks adjusted, flange clamps mounted and tightened and then the mandrel clamping plate, washer and nut removed to allow the tool access to the hub face while the opposite hub face contacts and is supported by the clamping flange of the mandrel.

O.D. and contoured faces were then turned to within .050" of finish per side and the piece stress relieved for the second time. Rough milling took place at this point, when required, as in the case of driving teeth cut in the hub. Stock of .010" was left on all sides of these teeth for later finishing and the piece was now stress relieved for the third time. The turning process was then repeated to within .010" of finish and stress relief took place for the fourth and final time. Finish cuts were then taken on the bore, contours and hub faces. Checking of the contours was done by gage with the piece still mounted on the fixture. Finish milling of the slots was the final operation.

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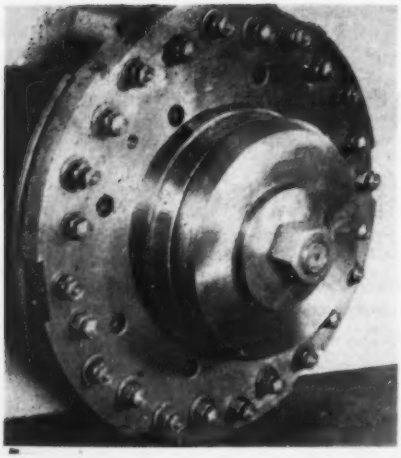
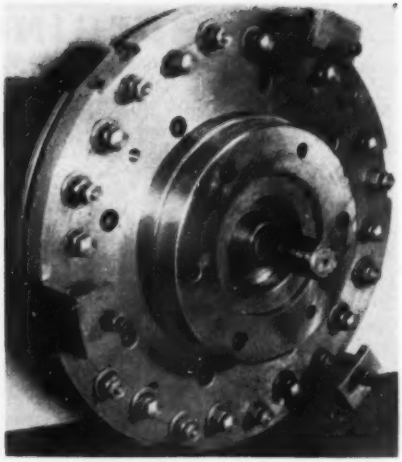




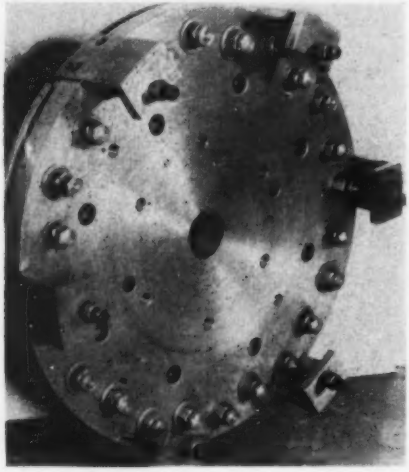
This sequence shows the fixture as used for:

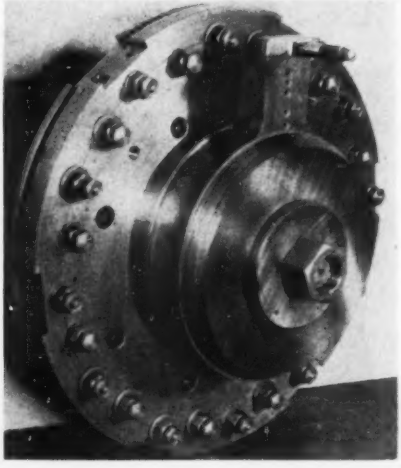
(1) Turning OD and contour.

(2) Facing hub.

(3) Boring.

(4) Checking contour.





Troubles

The most time-consuming operation was the setting of the jacks. This became necessary with increasing frequency (and annoyance) as the work progressed because of the warp tendency increase as the piece became thinner in cross-section.

After each cut in the finishing stages, jacks were checked with a feeler gage inserted between the jack and the piece to determine if the flange had warped in a direction away from the jacks. If

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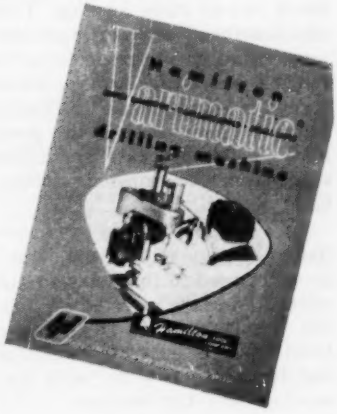

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such was not the case, an indicator was mounted on the tool block, brought up to touch the flange, and jacks backed off. Any warping in this direction could then be observed by watching the indicator as each jack was backed off. Jacks then had to be reset. This was done by hand using two end wrenches and a dial indicator, reading in tenths, to observe movement of the flange when each jack was brought up to touch. Jack screw and lock nut were then tightened in such a way as to leave the indicator zeroed. Jacks were tightened by progressive division of the hole circle rather than successively in order to minimize a warp that might be built up artificially by bad jack adjustment. Cuts were then taken according to which way the flange moved, and in such a manner as to approach the eventual dimension within limits.

Warping was a real problem and we never solved nor discovered what caused it. It appears to be a skin effect. It was, however, unpredictable as far as direction of movement or amount of movement. Following the second cut after stress relief the warp was usually of a minor amplitude and within tolerance.

Foreign metallic inclusions, which were very hard, appeared near the center of two or three forgings. These usually fractured the cutting edge of the tool. There was nothing to be done but regrind and keep cutting. Usually the layer containing the inclusions was completely removed in the process but in at least one case inclusions were evident on the finished surface in the form of pits.

The duplicator had a tendency to leave a step where the longitudinal feed reversed in following the changing contour, but by careful adjustment of the duplicator this step was reduced from .002" to .0002" by indicator reading. It could not be felt with the fingers moving over the contour.

Speeds of individual feeds were adjusted by the flow valves on the console of the duplicator when primary direction of cut changed from O.D. to face cutting and again from face cutting to O.D. cutting at the hub.

It proved to be very important to be able to control individual feeds over all surfaces being turned, for only in this way was it possible to produce a uniform finish. The position of the flow valves on the console of the Tracer Control Duplimatic made this easy for the machinist to do as he watched the cut.

Since the maximum finished diameter we turned was in the neighborhood of 18.6" and the lathe used was only a 16" lathe, our fixture design was cramped. A larger lathe would, of course, have been more suitable for the job.

It would have been wise, no doubt, to have more than one man working on the actual machining simultaneously, because of the competitive encouragement and because it turned out to be a very tedious job.

"Show me where THAT is in our delivery instructions."

CK MILLING MACHINE SPEEDS OUTPUT OF STANDARD PRODUCTION PARTS

THE FACTS ON THIS JOB ARE: Machine: No. 6 — Model CK Plain (25hp) with heavy-duty universal Milling Attachment. Part: Large fusilage spar fitting — overall dimensions 39-5/16" x 17-3/8". Material: Aluminum Alloy 75ST (forging). Tool: 2-inch, 2-lip end-mill. (HSS). Speed: 265 rpm. Feed: 3-1/8 ipm.

TEN ALUMINUM ALLOY 75 ST (FORGING) AIRCRAFT SPARS PRODUCED EVERY HOUR
CK MILLING MACHINE FEATURES THAT HELP DO THIS JOB BETTER

- This CK milling machine has 24 different spindle speeds (13 to 1300 rpm), with 32 different table feeds (3/8 to 90 ipm). Operator was able to pick proper speed and feed, benefit from high horsepower modern tools.
- Greater rigidity of new CK column easily absorbs vibration from heaviest cutting loads. Only single pass needed for each part.
- CK's 3-bearing spindle and flywheel assures Maximum Cutter Efficiency. On this job, it meant fast metal removal and excellent finish in a single pass.
- CK's new heavy duty (2" dia.) table feed screw gives greater bearing contact for smoother feed performance and sustained accuracy.
- New CK machines have greater horsepower. On this job, 25 hp permitted operator to get maximum production from this modern cutter.

HERE'S a typical example of how relatively inexpensive tooling greatly increases the versatility of Kearney & Trecker's new CK milling machines . . . producing a completed part every 6 minutes. Two operations were required for each part — (one) milling out the holes and recessing on the edges, then after changing the attachment setting and cutter — (two) finishing the inside (see photo). For the full story, contact your nearest Kearney & Trecker representative or write: Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wis.

FIND OUT HOW YOU CAN *LEASE* A NEW C.K. MACHINE. WRITE FOR BULLETIN TL10A.

KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS

New Fluteless Drill Is 66% Cheaper

By **Howard A. Hayden**

ADVANCED metal-joining techniques sometimes make it possible to redesign equipment and reduce its cost. A new type of fluteless drill, fabricated with little regard for conventional techniques, made use of these new materials and procedures to produce a superior drill. Although any fluteless drill is cheaper to produce than its fluted counterpart, the new design avoided three machining operations and thereby permitted large additional savings.

The drill was originally intended for use with plastics using a carbide tip as the cutting edge. Chip disposal constituted a serious problem when conventional twist drills were employed so it was decided to solve this problem by Gordon measures and eliminate the flutes. A carbide tip was combined with a steel shank of about half its diameter. As chips were produced, they were guided by the tip into the annular space between the hole and the shank, where they could not interfere with the action of the cutting edge.

For certain plastic materials which do not respond at all to the conveyor action of fluted drills, the advent of the new tool was particularly significant. Another group of plastics presented no particular problem so it was immaterial which tool was used. The absence of flutes was a disadvantage in drilling relatively few plastics and as the fluteless drills were effective upon cast iron as well as upon most plastics the few applications upon which they failed could be disregarded.

The drill was intended to drill plastics, using a carbide tip as cutting edge. Chip disposal constituted a serious problem when conventional twist drills were employed. A carbide tip was combined with a steel shank of about half its diameter. As chips were produced, they were guided by the tip into the annular space between the hole and the shank, where they could not interfere with the section of the cutting edge.

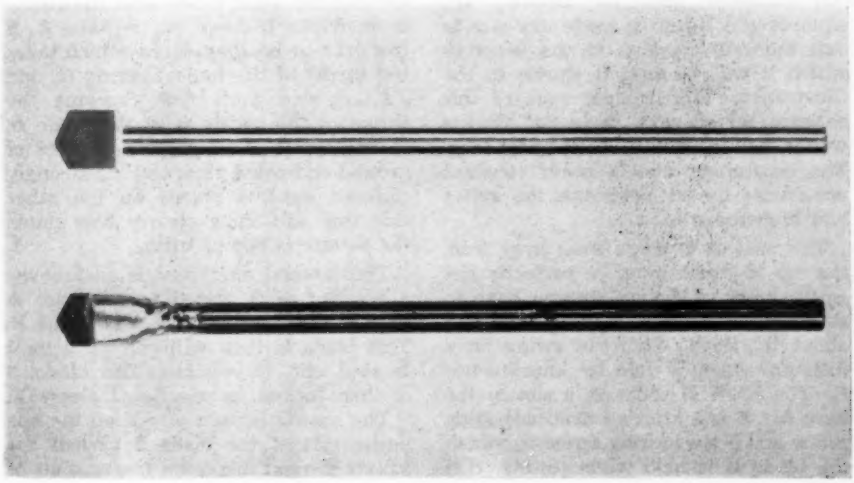
A slotted shank is the conventional method for tipping fluted drills and the originators of the fluteless drill followed this procedure. The end of a bar was slotted and turned down to form a shank, the final diameter of which was half the width of the slotted portion. In order to provide for chip ejection, the amount of metal on each side of the slot was reduced to the minimum figure estimated to do an adequate job of driving the tip and at the same time providing sufficient space for chip ejection.

Compared to carbide-tipped drills of high speed steel the above construction produced a tool much more economically. In view of the need for fabricating the shaft from oversized stock, however, the savings were not nearly so great as could be achieved by brazing a tip to a shank of the correct diameter. The shank was cut from stock which was 50% of the diameter of the drill and brazed to the carbide tip without using a slot. This procedure eliminated one turning and two milling operations. Since brazing was required in any case, no new operations were introduced. The braze metal performed a dual function, it bonded the components together and transmitted driving torque to the tip.

A number of problems had to be solved before the final design evolved. A problem existed in the need to locate and hold the components so that brazing could be performed with accuracy. This was accomplished by holding the shank in the collet of a hand screw

Top: Shank and carbide tip will be brazed together, forming a fluteless drill of advanced design. The braze will perform the dual function of cementing the components and transmitting torque from one to the other. As no slot must be provided for the tip, one turning and two milling operations are eliminated.

Bottom: Complete assembly, with braze built up to guide chips away from the cutting edge. By means of an exceptional braze material, a joint is obtained of greater tensile strength than the shank. Total cost is 10% that of fluted drills and 33% that of conventional fluteless designs.



machine and pressing the tip against the shank with a locating pin held in the turret of the screw machine. The pin served to center the carbide tip and press it against the shank. A carbide bushing, attached to the end of the pin, had the hole aligned with the spindle so as to position the tip within concentric limits of .005". After one side of the assembly was brazed, the spindle and tip were rotated 180° to permit completion of the job.

The main problem was that of choosing a brazing material with the necessary properties in end use. EutecRod 16, manufactured by the Eutectic Welding Alloys Corp., Flushing, N. Y., was selected because of its high strength characteristics and the low application heat. The tensile strength of its deposits, up to 100,000 psi, was greater than that of the shank itself.

Despite the recommendations of the manufacturer a comparatively heavy build-up of this alloy was deposited on the back of the tip. It was thought that this build-up would facilitate the driving of the tip and the guiding of the chips of the material drilled. It was done symmetrically on both faces of the tip so that as chips were formed on the cutting side they would be guided along the tip and up into the annular space between the hole and the shank. It was found that the unusually strong bond obtained between the carbide and the braze metal, coupled with the difference in coefficient of expansion, caused this build-up to generate high bending and tensile stresses in the carbide. With some of the larger experimental drills, cracking occurred when the temperature of the metal was still more than 300° F. above room temperature.

If the braze could develop stresses of sufficient magnitude to crack the tip, it was obviously stronger than required for the normal cutting action of the

An Indicator Gage for Testing Squares

By **James Pearman,** Consulting Engineer

AN indicator gage for testing try squares which can be made any size to suit the requirements of the plant in which it will be used is shown in the illustration. The original gage of this pattern, which was designed by the writer, had a blade **B** about 2 feet long. The instrument was in fairly constant use during the ten years that the writer had knowledge of it.

The base **A** is made from grey iron, the top of which must be perfectly flat as the bases of the try squares have to sit on it. The blade **B** is 2" wide and about ¼" thick. This can swing on a fulcrum which is held by knurled nut **C**. The blade **B** slides in a slot in the base **A**. **E** is a knurled head adjusting screw and **F** the locking screw by which the blade **B** is held when testing. **H H** are two cap bolts which hold the aluminum frame **D** down on the base **A**. **F** is a grub or headless screw which takes the thrust of the helical spring **G**, and **J J** are two push rods carrying the thrust of the spring **G** to the blade **B**. In the frame **D** is inserted a sheet of ground or frosted glass and if a strongly diffused light is placed on the other side this will show clearly how much the square is out of truth.

The method employed is as follows: a try square is placed on the base **A** with the blade in contact with blade **B**. This blade is then adjusted until light is shut out, if possible. The blade **B** is then locked by means of screw **F**.

The square is then placed on the opposite side of the blade **B**. When the square is next inspected the amount of

drill. Carbides do not crack in use except in cases of overloading. To eliminate the difficulty, the amount of joining was decreased and the problem solved. No further cracks occurred.

A greater degree of care was necessary to maintain accuracy as the sizes of the drills decreased. The torch raised the temperature of the entire tip when the smaller sizes were involved so that the molten braze metal covered the surface almost instantaneously. This problem was solved by a grinding cut, following the bonding operation, which resulted in a groove across the face of the tip to direct the movement of chips. This procedure was necessary for the smaller drills only.

As finally determined, the brazing procedure for all drills was as follows: The parts to be joined were degreased, coated with Eutector Flux 16B, and fitted in the screw machine with between .002" and .005" clearance. The neutral flame of an oxy-acetylene torch was used and kept in constant motion. When the base metal reached the alloy's bonding temperature (1600° F.) for thin-flowing applications, the flux became liquid. This was the signal to apply the alloy and prevented over-heating, warpage and distortion. The superior wetting properties of the flux combined with the high capillary action of the alloy ensured complete penetration of the joint.

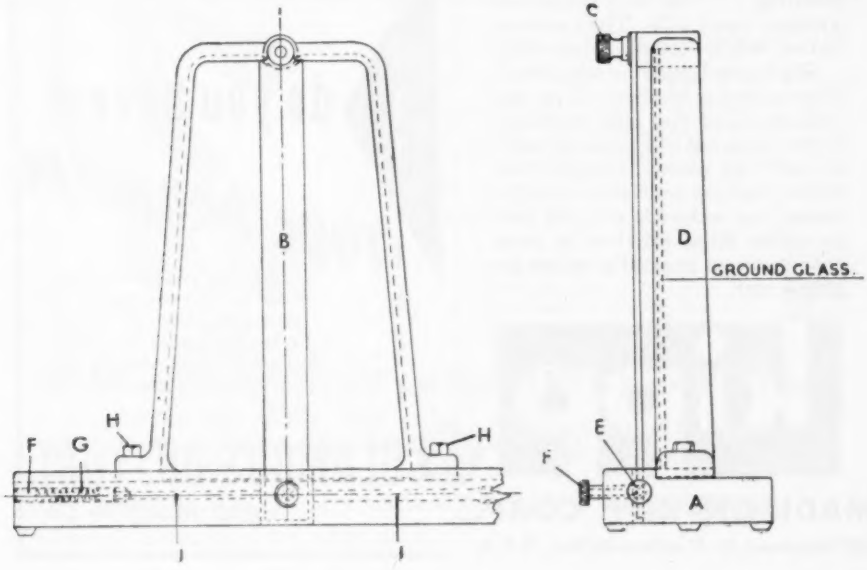
---

light visible is TWICE the amount of the inaccuracy of the square.

Truing up is now a simple matter because as the work proceeds and with repeated trials, the blade **B** is adjusted from time to time until finally the try square shuts light on both sides of the blade **B**.

The square now being true on the outside, the inside can be made also true by the blade of the square and the stock being made parallel.

The End.



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The brazed assemblies were placed in a salt bath at 480° F. This had the additional value of relieving stresses to a certain extent. The carbides were then dipped in a red sealing compound, to form a contrast with the blue color of the shank.

The special purpose alloy, formulated for a specific use, was the factor which made the entire operation possible. It permitted the redesign of the tool for greater efficiency and reduced the cost of manufacture very considerably. The tools were produced at 1/3 of the cost of the conventional method of forming a shank and reducing it to the correct diameter, and 1/10 of the cost of a high speed steel drill with a carbide tip.

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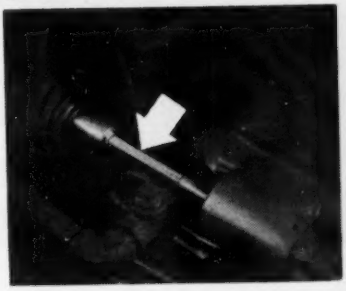

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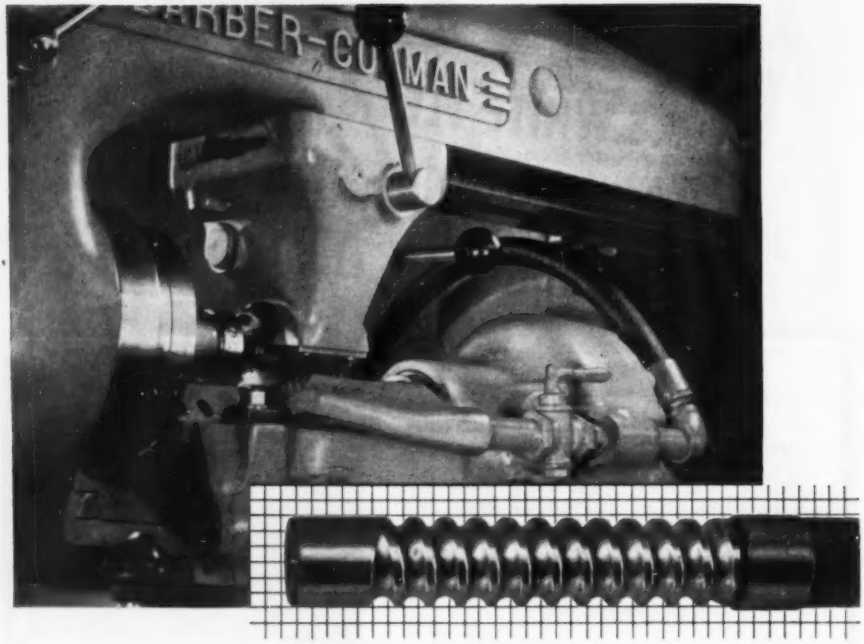


Standard Hobbing Machines Solve Special Problems

standard barber-colman machines with special tooling cut internal and external threads

The wide range of versatility to be found in the basic design of Barber-Colman Hobbing Machines is illustrated by these internal ball nut and worm shaft threading applications. Standard units and assemblies are used wherever possible for these special applications.

A standard No. 14-15 Hobbing Machine has been equipped with a special hob slide, special work support bracket and modified gear train to thread mill this worm shaft steering part with ease and production economy.

Likewise, a standard No. 16-16 hobbing machine, with special work slide, hydraulic holding equipment, cam vertical feed and special cutter slide replacing the conventional hob slide, is arranged for internal thread milling the ball nut mating part.

These jobs are examples of special applications which can be adapted to standard hobbing machine operation through special tooling and machine arrangements.

thread milling the worm

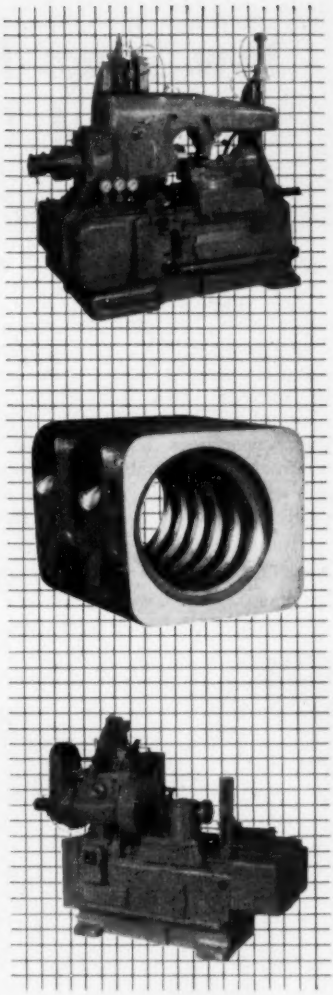
For milling the worm threads, the hob slide is equipped with a thread milling cutter and is positioned 90° from standard, so that the cutter spindle is parallel with the work spindle. The gear train has been modified so that feed and index gears advance the cutter properly to cut the worm threads. The work center bracket support has been designed to provide maximum rigidity of the work piece during the cutting operation. Vertical feed is used to plunge cut to depth, and then the cutter is fed axially to finish the thread.

milling internal threads on the mating part

The machine used to mill the internal threads on the mating part is a special No. 16-16 Hobbing Machine, with special cutter slide positioned permanently so that the cutter spindle is parallel with the work spindle. The gear train has also been modified to advance the cutter in proper relation to the worm threads. Hydraulic holding equipment is employed to clamp the ball nut in position for milling. Clamp and release are operated conveniently by a control valve located on the work slide upright.

Since the No. 16-16 Machine basically does not include vertical feed this arrangement has been added through cam action. A shank-type cutter with special outboard pilot support to steady the cutting action is used, since a small diameter cutter is needed for the internal cut.

When you have problems of producing special forms, equally spaced on a cylindrical base, within the range capacity of standard Barber-Colman hobbing machines, consult our engineers for suggestions on how you may adapt this type of equipment for efficient, economical production. We'll be glad to discuss the adaptation of these machines to meet any of your requirements. Just send us prints or specifications for analysis.



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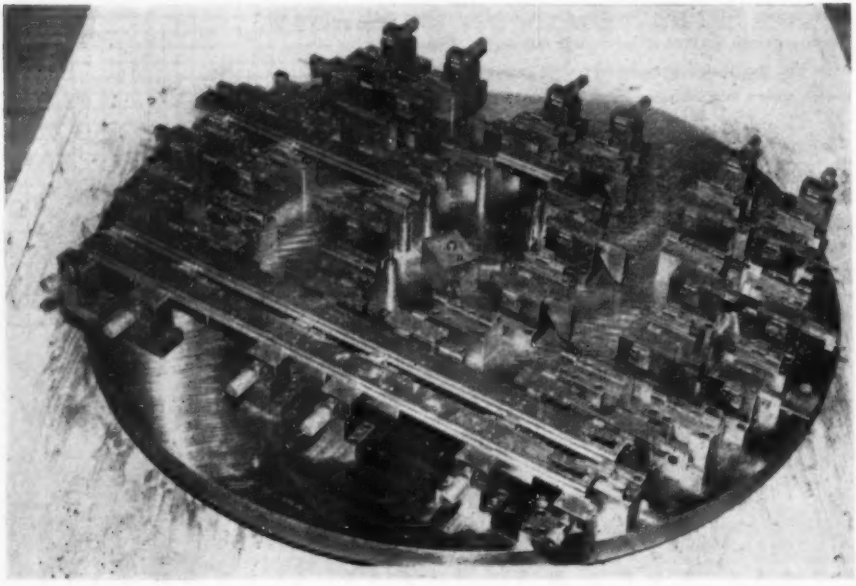
New Setups Facilitate Grinding of Typewriter Components

By **Herbert Chase**

TOOL engineers of Plant 2 of the International Business Machines Corp., Poughkeepsie, N.Y., have developed the circular rotating fixture here illustrated, to increase the grinding rate on channel-like stampings for IBM electric typewriters. Each side leg of each channel is previously formed to produce a V-groove whose side faces are precisely ground in a later operation. In the fixture shown, the bottom face of the channel web is placed uppermost and horizontal and is ground flat, partly to serve as a locating face when the V-grooves are ground subsequently.

In the assembled typewriter, the carriage travels in roller assemblies along the V-grooves. Before the grooves are ground, the flat face of the web must be ground so that its length is parallel

New IBM fixture for use on a Blanchard machine. Several parts of different lengths can be clamped in place at one time and grinding continues on some parts at all times while others are being loaded and unloaded.



to the length of the grooves. Hence, in the grinding fixture, location is from the rough (as yet unground) grooves. Rolls, spaced to duplicate spacing in the typewriter, are applied in the fixture so that they are clamped in the grooves to locate the work pieces. Adjustable wedges are used to press the rolls into the grooves.

This method of clamping was used in earlier setups but they involved grinding only one or two pieces at a time in an ordinary surface grinder whose operator remained idle while the grinding progressed. As faster work with less labor per piece was desired, the fixture shown here was built and is applied to a Blanchard grinder using a horizontal wheel.

With this fixture turning slowly and the wheel covering hardly more than one quadrant at any time, the operator can unload one work piece and replace it with another after the ground piece is moved free of the wheel and without interfering with other work pieces still under the wheel. In other words, unloading and reloading are done while grinding proceeds and without stopping the fixture. This saves idle time and grinding is done much more rapidly than before. Several pieces are in process at the same time and several different lengths can be handled in the fixture simultaneously because a large area is available for several individual fixtures of different lengths on the dial.

In the subsequent operation, V-grooves are ground in four channels at a time in a Thompson grinder equipped with a gang of four wheels on one arbor. Crush dressing is done on the V-shaped periphery of all wheels after each fourth load is ground. Thus, each wheel makes eight passes between each dressing. For this operation, the channels are set in pairs, one channel being at each side of a magnetic chuck. Two magnetic chucks are used. Channels are so placed that the flat bottoms previously ground are vertical and against the side faces of the chucks. When so located, the V-grooves come below the four wheels which then grind one side of each groove per pass.

The End

"Would it help me to apologize, sir?"

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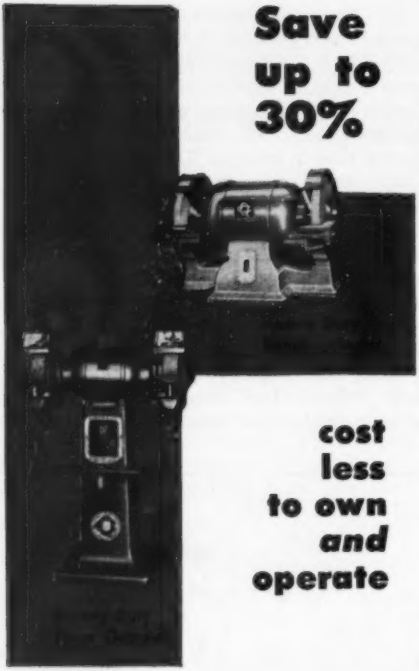

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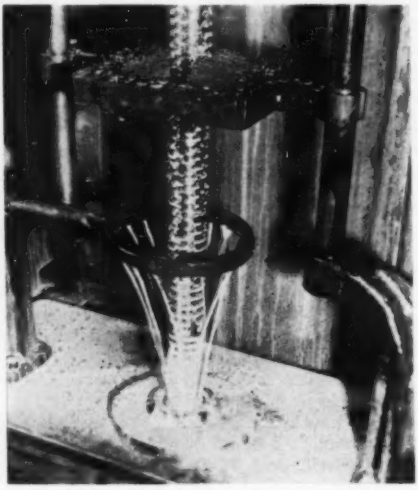
Prior to adapting brushes to this job the broaching bar would quickly load up with chips causing rough and inaccurate splines. The machine operator was paid on a piece basis, and received no penalty for rejects. The net effect was a 12% rejection rate because of "run-outs," the tendency of the gear to run out of alignment with the splines.

Brushing has successfully solved this problem, and, in addition, has helped double the life of the broaching bar before it must be removed for resharpening, in itself a costly operation.

A VMS-10-48 pull down Colonial broach machine is used, adapted with a special holder mounting four brushes. The four brushes are so mounted around the

The brushing fixture is shown just above the coolant ring. The continuous coolant flow removes some chips, but the brushes do the big job. This photograph shows the machine in the up-stroke. Chips are removed on the up-stroke. Those remaining are brushed off on the down, or power stroke.



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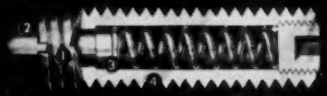

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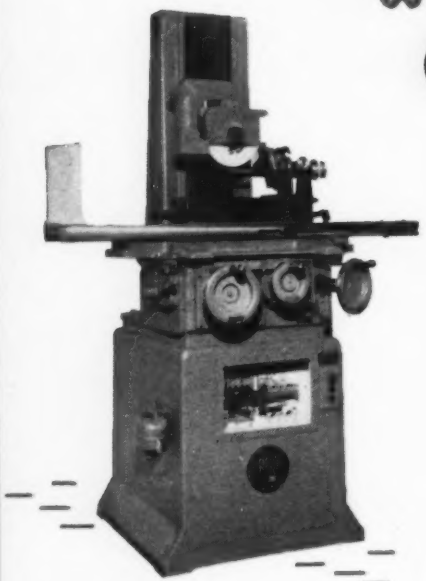

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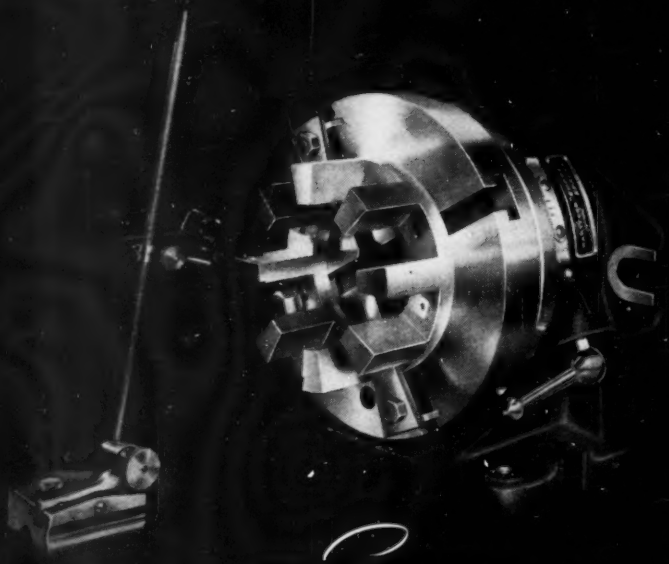

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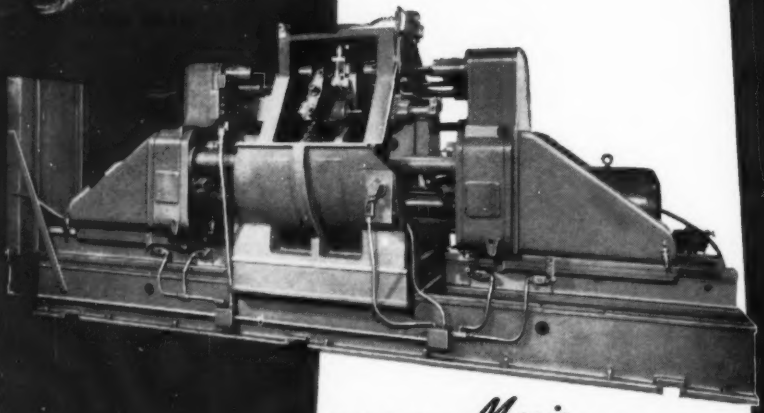

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6	Chamfer four holes

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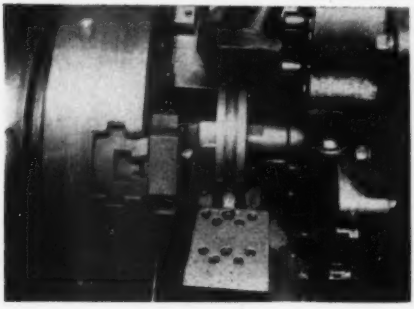
broaching bar that the bar is surrounded by wire bristles. The brush bristles are .005 steel wire, two inches long, used in three-inch strips. Width of the brush face is one-quarter inch. This installation was developed by International Harvester with the cooperation of the Osborn Mfg. Co., manufacturers and designers of power brushes.

"Throw-away" tungsten carbide button tools eliminate grinding on pulley grooving job

One of the more prominent manufacturers of earth moving equipment heretofore used a conventional brazed carbide forming tool to plunge groove a 5/16" radius ½" deep into the face of a 10" dia. SAE 1040 steel pulley on their Potter & Johnston lathe. Initial grinding of this radius tool was rather expensive and maintaining the required form in regrinding was most difficult.

As a result, this plant's engineers designed their own grooving tool utilizing a standard ⅝" dia. standard Kendex insert, style RD-10 of grade K2S Kennametal sintered tungsten carbide. With this "screwed-on" indexable insert tool, 100 to 125 pulleys are now being grooved after which the insert is rotated 180° to provide an entirely new cutting edge. Thus, 200 to 250 pulleys are grooved after which the insert is discarded and replaced with a new one to eliminate all regrinding. Depth of cut on this operation is ½" and feed is 0.015" at 160 sfm.

Outside diameter of the pulley is turned prior to the grooving operation. Two Kennamatic tungsten carbide triangular insert tools are used for straddle facing the sides of the pulley while grooving with the Kendex insert tool as shown in the accompanying photograph. In a subsequent operation a 120° included angle is machined tangent to the groove radius.



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By Jam[redacted]h

WHEN are "special" shop built tools worth their extra cost?

"That depends," says A. B. Carpenter, Supt. of Fabrication at Minneapolis-Honeywell Regulator Co.'s new, Gardena, Calif., plant, which is a 62,500-sq. ft. machine shop, fabricating appliance controls which are assembled in another Los Angeles area Honeywell plant.

By "depends," Carpenter refers to units involved. "When our sales engineers tell us that we'll sell say 100,000 of a certain unit, we start thinking about automatic, special-purpose machines. We know, for instance, that the average shop-built machine will cost about one-third more than the drill presses and turret lathes it replaces."

A good example is Minneapolis-Honeywell's 8-station semi-automatic machine whose 30-in. dia. Geneva type index table can handle 34 drilling-tapping operations. This single-operator machine cost about $35,000. It was built from such standard tools at 12 drill presses, each equipped with a Bellows drill press power feed. (Six of the Bellows are equipped with Hydro-Checks, the other six, with intermittant pneumatic speed controls for tapping. A Bellows Hydrair drill is also integrated into the machine).

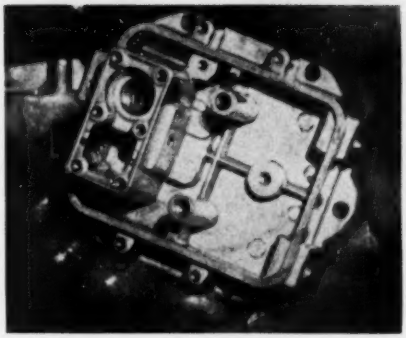
This single machine does the job formerly assigned 9 drill presses and two turret lathes. Moreover, it gets its job done with a single operator, whose job classification is similar to a drill-press operator's. Yet, whereas the 11 machines it replaces could be bought for about $19,000, this multi-job drilling-tapping rig involved at least $35,000, probably more. Actually, the design took shape during the war years, has since been gradually perfected.

Each modification added to the overall cost. Still, Honeywell's A. B. Carpenter has plenty of proof that the investment was worthwhile: formerly the 11 operators working 11 drill presses and turret lathes could turn out only 30 finished castings an hour; the ma-

chine and one operator produce 155 hourly. It can do in 2 hours what eleven machines couldn't accomplish in 8. And during some two-shift days, as many as 2000 units have been produced on this semi-automatic machine.

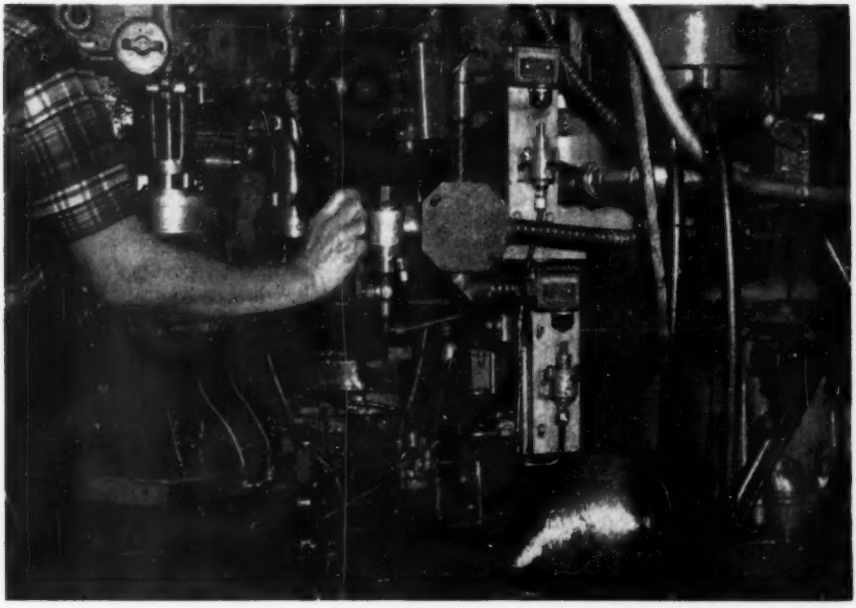
There is another side to the story: putting all a shop's productive eggs in one basket. If a single operational sequence breaks down, the other 33 are necessarily halted. But if a drill press is down, it can be by-passed, another quickly substituted.

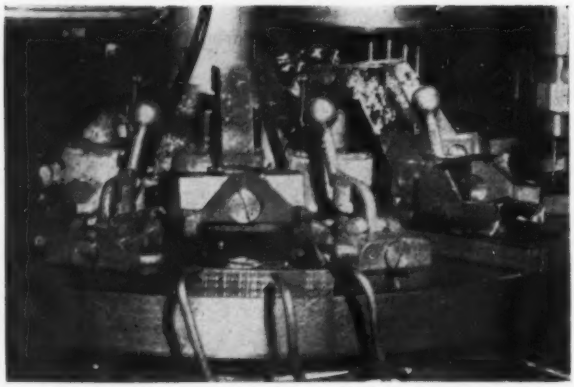
"Actually," maintains Carpenter, "our shop-built semi-automatics do occasionally break down. But even an occasional work-stoppage isn't too bothersome. We can shut-down for several hours, yet once we're running again the machine out-produces the



This appliance control casting was machined on a single multi-purpose machine at Minneapolis-Honeywell Regulator Co.'s Gardena, Calif. plant.

Special shop-built tool does work formerly assigned nine drill presses and two turret lathes. All told, 34 operations are supervised by a single woman operator.





Close-up of the air-cleaning nozzle and holding fixtures.

older drill press operation. An extra hour and we catch up."

Around the 30-inch Geneva type index table, at 7 of the 8 stations (one station for loading) are the 12 Delta drill presses. Bellows power feed units make rapid traverse approach-and-return a high speed operation. Two of the drill presses have six spindle drilling heads; two have six spindle tapping heads; one has a two spindle tapping head. All others are single spindle.

Only manual operation is when the operator unloads-loads, then pulls an indexing lever, indexing the table one station, and bringing before her a finished casting.

An unmachined casting is held in an air-cylinder fixture, prelocated on two tapered pins. In operation, machinist trips the holding-fixture's air cylinder, removes machined part, hits fixture-cleaning air valve. This valve actuates 80 p.s.i. of air, directed at fixture from three copper-tube nozzles. Cleaned, the fixture is ready to receive a new casting. The part is positioned by the operator, then air-locked (fixture utilizes 300 p.s.i. to hold). A sequence button starts hydraulic mechanism—thus the indexing cycle.

Heads must retard and clear work after each operation before the table can be indexed. Since one station may be drilling a 1/16-inch dia. hole, another a hole 1-inch dia., different speeds and feeds are necessary. So every drilling head has individual controls (there are some 70 Micro-switches and other limiting devices). Such exact feeding means longer tool-life.

One press, for example, drills a horizontal hole and another taps the drilled hole with No. 6-32 tap. To index the table, both of these heads must lift upward approx. 30 degrees, enough clearance so neither casting nor fixture strikes tools as table indexes. To gain necessary clearance, these two presses are mounted on a hinged bracket. Attached to each is a pivot-mounted 8-in. dia. Power Dome with Electroaire valve. The retracted power feed closes an impulse switch on each, energizing a valve remotely controlling the Power Domes' air cylinders.

Clearer understanding of this 34-operational setup is gained from the operating sequence:

Station 0—Loading

Station 1: Has one vertical, single spindle drill press equipped with 6 spindle Ettco-Emrick multi-head. Drills and counterbores (step drill)six only No. 43 x ¼ deep, No. 33 CB x 1/16 deep holes. One side, single spindle drill press: Drills one No. 50 x 3/16 deep. One side single spindle, tilting head

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drill press: drills one No. 36 hole x 5/16 deep hole.

(Total operations this station: 8)

Station 2: One vertical, single spindle drill press equipped with 6 spindle Ettco-Emrick multi-spindle head. Taps six only 4-40 threads to bottom. One side single spindle tilting head drill press: taps 6-32 thread to bottom.

(Total operations this station: 7)

Station 3: One vertical, single spindle drill press equipped with two spindle Ettco-Emrick multi-head. Taps one 6-32 thread to bottom. Taps one ⅜-32 thread.

(Total operations this station: 2)

Station 4: One vertical, single spindle drill press: drills one No. 47 x 5/16 deep hole. One side single spindle drill press: taps one 2-56 thread to bottom.

(Total operations this station:2)

Station 5: One vertical, single spindle drill press equipped with six spindle multi-head. Drills four only No. 43 x 5/16 deep holes. Drills and spotfaces step drill No. 27 x ½ deep hole and spotface column.

(Total operations this station: 6)

Station 6: One vertical, single spindle drill press equipped with six spindle multi-head. Taps four only 4-40 threads to bottom. Taps two only 8-40 threads to bottom. One side single spindle drill press: drills 3/32 bleed hole.

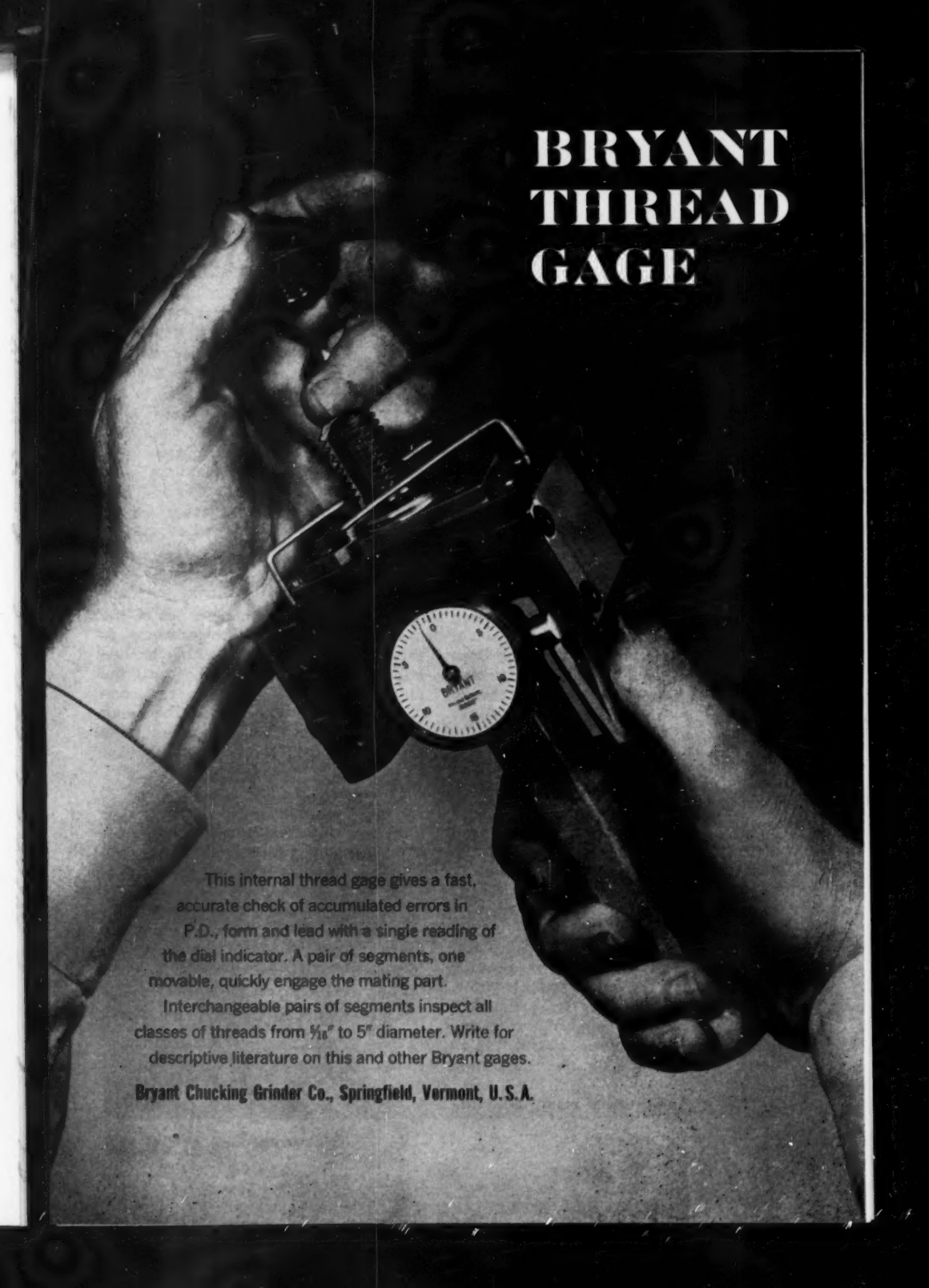
(Total operations this station: 7)

Station 7: One vertical, single spindle drill press taps 3-48 thread to bottom. One side single spindle drill press: taps ⅛ N.P.T.

(Total operations this station: 2)
(Total operations all stations: 34)

The End

The 8-station, 34-step drilling and tapping machine, showing positioning of drill presses.



This internal thread gage gives a fast, accurate check of accumulated errors in P.D., form and lead with a single reading of the dial indicator. A pair of segments, one movable, quickly engage the mating part. Interchangeable pairs of segments inspect all classes of threads from 1/16" to 5" diameter. Write for descriptive literature on this and other Bryant gages.

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Two Ideas . . .
Roller Conveyor Reduces Idle Time
Circular Replaces Linear Flow

By Tom Brown

A MACHINE tool is earning its keep only when it is actually cutting metal and anything which will reduce machine idle time during loading proves profitable. Handling time for heavy castings, like those shown in the illustration, can prove inordinately long, but if the time required to make a cut is of long duration also, it is advisable to try to prepare the work for quick loading while the cut is being made.

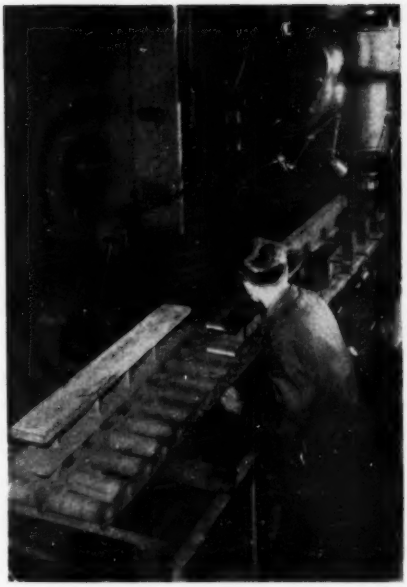
The method used in the example illustrated is to slide the work out of the jig on to a roller conveyor placed in line with the machine table. A second roller conveyor is linked to the first one and the whole assembly can be moved transversely by means of a handle secured to the front conveyor. The conveyor assembly runs transversely on rollers on angle iron tracks, which are supported on a steel framework placed at the end of the machine table.

The operating cycle comprises sliding the finished component out of the milling jig and on to the conveyor, as shown. The conveyor assembly is then pulled towards the operator until the unmachined work piece on the conveyor is aligned with the jig. The rough work piece can now be slid into the jig and clamped in place and the cut started.

Unloading of the machined piece is now accomplished by lifting and moving it to the stack on the floor by means of an air-operated block and tackle (not visible). An unmachined component is raised and placed on the rear conveyor which is then pushed away by the operator, leaving the front conveyor ready for reception of the machined work piece when the cut has been completed.

Circular Replaces Linear Flow

There are occasions when the normal straight line conveyor can be replaced profitably by conveying of products in a circular path. One great advantage



Handling time is reduced on this milling operation by utilizing a roller conveyor to load and unload heavy castings. Loading, or unloading, takes place while one piece is being machined.

is that much less floor space is occupied by the circular method, and sometimes, power driven work carriers can be dispensed with altogether.

In the packing of replacement piston sets for tractors, for instance, the placing of four girls around the perimeter of a fixed circular table has raised output by 15% over the former method of placing the operators on either side of a straight line conveyor. Operator reach is reduced considerably and the co-ordination between operators is greatly assisted.

The task of packing piston sets also includes the assembly of rings and gudgeon pins. Two girls perform the

A circular conveyor table is used to grind a spot and hardness test railroad tires and wheels. The table moves a quarter of a turn when a foot pedal is pressed. On man loads, the other unloads. Previous method was to move from wheel to wheel with portable tools.

assembly operation and the other two girls wrap and pack the pistons in cartons. Pistons are passed from asssemblers to packers by merely sliding them over the metal table surface. Above the packers are placed pre-cut wrapping materials which can be picked up by a short reaching motion. In the photograph it can be seen that strips of corrugated cardboard are suspended in a stack below the packing station so that they can be pulled out quickly.

Another adaptation of the circular conveyor is shown in the second illustration. This is a power driven turntable used in the hardness testing of railway wheel tires at the plant of a mass producer of both railway wheels and tires. The two men load and unload the tires, grind various smooth patches on the upper surfaces and then make a hardness test with the machine on the left.

One operator is fully occupied with loading and unloading the tires by means of the electric hoist and the special grabs shown at the right hand side. The table is indexed a quarter turn by depression of a foot pedal which switches on the traversing motor. After the loading station, the tires pass under the special grinding machine shown which has a lever for pulling the wheel into contact with the tire to grind a smooth surface suitable for indentation by the hardness testing machine.

When the tire is indexed through the next quarter-turn, the ground surface is in the correct position for receiving the testing machine anvil. This turntable supersedes the former method of using portable tools and carrying them from tire to tire and has increased production, in addition to ensuring greater precision in hardness readings.

The End.

In this packaging and assembly operation output was increased 15% by placing the workers around a circular table. Formerly a straight line conveyor was used.

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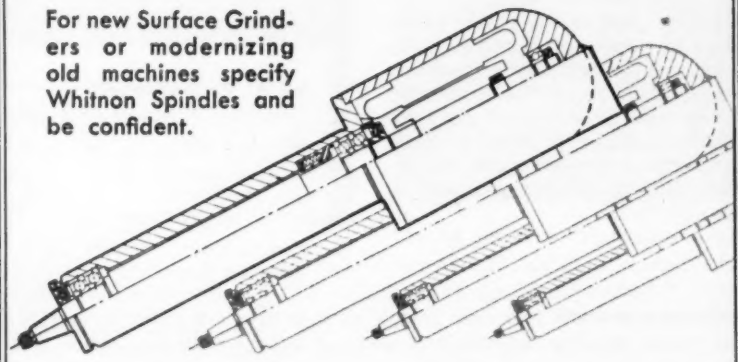

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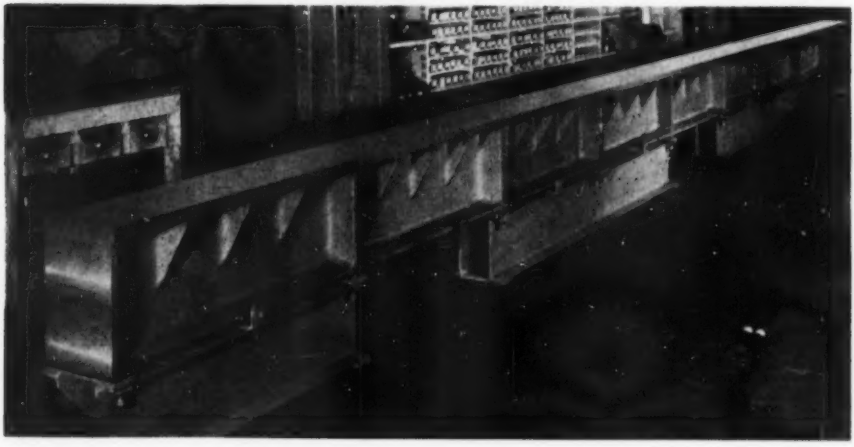
A "New Look" in Surface Plates

THE surface plate is one of the prime requisites for meeting present day demand for greater accuracy in machine tool work. Made from fine grain cast iron, Meehanite, or semi-steel and having either machined finished or hand scraped surfaces, depending on the application, these plates are available in various new forms.

By **A. P. Dieffenbach**
Goodman Manufacturing Company
Chicago, Ill.

An outstanding example of a long surface plate is shown in figure 1. It is 12 inches wide, 17 inches deep, and 40 feet long, made up of three individual plates 13'-4" long each, keyed and bolted together at the joints to provide an effective length of 40 feet. This particular long plate is used to check the straightness on airplane wing struts.



Heretofore, surface plates have been mostly of a square or rectangular design. There are still many applications where the rectangular design is to be preferred, but in general, the new round type surface plate, figure 2, is the optimum design. The following advantages are noteworthy:

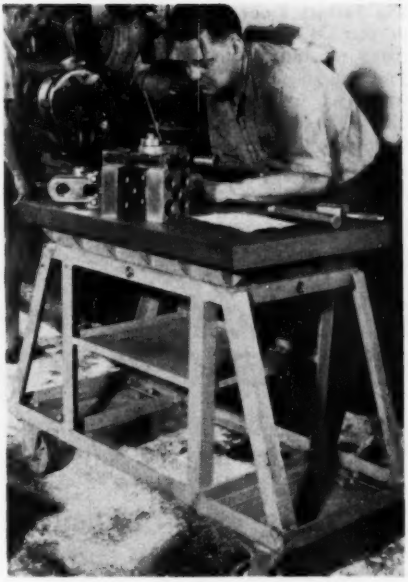
1. Ideal for checking round objects. Circular lines scored in the top surface provide quick setup for inspection.

2. Any expansion or contraction, due to temperature variations in the metal, will cause less distortion to the surface of the round plate than on an equal sized rectangular plate.

3. Fewer void spots, such as those midway between the corners on the rectangular plates.

4. Smaller plate than its equivalent rectangular plate, and hence a reduction in weight, area, and price of plate, and a saving in metal.

5. Neater, more streamlined appearance.



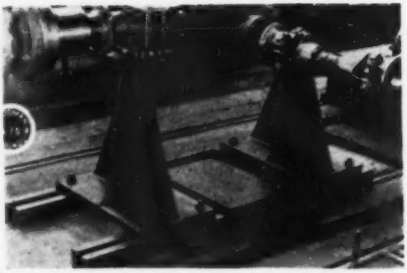
The old adage of "moving the mountain to Mohammed" has been applied effectively here. Figure 3 is a standard 2' x 3' Surface Plate, weighing about 450 pounds, on a portable stand. The assembly has been moved next to an internal grinding machine working on small aircraft parts, so as to facilitate inspection of these parts after grinding and expediting their passage on to the next operation.

Another portable arrangement is shown in Figure 4. Built for an automobile body plant, each Surface Plate section is 5 ft. by 8 ft. Assembled as a unit, the sections provide a 10' x 16' surface for large work that occurs only intermittently. Screw jacks built integral with the plate provide a solid foundation when the plate is in use. When needed in another area of the plant, either complete or in part, the sections are easily moved on their rollers.

The Surface Floor Tee-Rail was developed to provide a level foundation for temporarily mounting equipment.

Figure 5 shows an installation of Tee-Rails, anchored in concrete, providing fast facilities for erecting and dismantling Dynamometers being tested under load.

A typical Surface Floor Tee-Rail is 8" high, has machined top and bottom surface 4" wide, and a length of 11 feet. Longitudinally, in the top surface, is a machined tee-slot provided for ¾" or 1" bolts.



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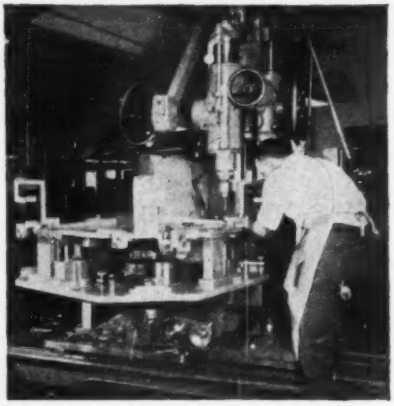

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THE LONG VIEW

on the buying and leasing of industrial equipment

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(Payment Analysis per $1,000. Sixty Equal Monthly Payments)

	Remaining Principal	Total Payment During Year	Total Cumulative Payments
Payment at Shipment	—	—	250.00
End of 1st year	600.00	190.89	440.89
End of 2nd year	450.00	181.89	622.78
End of 3rd year	300.00	172.89	795.67
End of 4th year	150.00	163.89	959.56
End of 5th year	None	154.89	1,114.45

The Lease Plan

Leasing may be advantageous when working capital is inadequate for necessary plant modernization or expansion, and when alternative uses of capital are more pressing or more profitable.

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To provide maximum flexibility, the plan is available in four variations, the principal differences being in the annual rental and return charges. With each plan, a 10 percent deposit is required, to be refunded to customers upon fulfillment of transaction. The minimum payment plan is shown below.

(Annual Rental per $1,000 Selling Price)

Year	Rent	Return Charge
1st	$180	$500
2nd	180	360
3rd	180	240
4th	180	120
5th	180	None
6th	180	None
7th	60	None
8th	60	None
9th	60	None

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Time Study . . . part 2
What is a Normal Operator?
Rating the Time Study

by **Harold R. Nissley,**
Professional Engineer
Cleveland Heights, Ohio

This is the second part of a series of articles on time study written by Mr. Nissley. The third part will appear in the October issue.

Synopsis of part 1.

Management, union, operator, time study observer all have an interest in the selection of the operator to be studied. Each one has definite ideas which must be resolved by the astute time study observer. Several case histories are analyzed: Which operator should be selected for demonstrating the fairness of a work standard that is in dispute; machine speed versus operator speed.

Another set of problems arise when there is only one operator performing a set of operations.

The Normal Operator

MANY operating men, and some engineers, talk confidentially about **the** normal operator. When pressed for a definition of a normal operator the definition may run something like this: "A normal operator is a normal person performing a task at normal speed —neither fast nor slow." This, of course, leaves the listener just where he **was** before the definition started.

An author of a textbook does a little better by saying: "A normal worker is an average type of worker, performing at an average rate of speed, under average working conditions and, as a result, producing an average daily production of average quality."* But what is average? Is it the average for a particular shop? If so, does it vary from summer to winter or from busy period to dull period? Is average the same for an entire industry—even south of the Mason and Dixon Line? Obviously these questions are unanswered in this definition.

Less nebular but still incomplete is

the definition given by a large steel company in an arbitration case a few years ago:

"A fair day's work for which **normal incentive compensation** is paid is the amount of work which can be produced by an **average qualified employee** through the **most effective use of effort, materials, and equipment** while working at a **normal incentive pace** during all portions of the workday other than that which is required for normal rest.

"Normal incentive compensation is a figured percentage of the established base rate and it is usually about 25 per cent. In other words, for incentive performance the company pays a premium over the base rate which is a regular established hourly rate for the job.

"An average qualified employee is a man who has been working on a given class of work long enough to have acquired the necessary skill and knowledge, one who is fitted for the work by nature, and one who possesses the required intelligence and education to perform satisfactorily the work at hand.

"The most effective use of effort comprehends the employee's effort according to proper methods. For example, job elements which can be performed while the machine is running rather than while the machine is down should be so performed. A further example is that all the job elements in the cycle of production must be performed in the established sequence and manner.

"The most effective use of materials comprehends the proper handling and use of both processed and processing material. Tools, lubricants, and supplies must be used in the established workmanlike manner. It requires that all materials be on hand in adequate quantity in the proper place and in proper condition.

"The most effective use of equipment comprehends the availability of the necessary amount of equipment which, when properly handled at standard speeds and with proper down time, will produce the production required by the production standards.

"The normal incentive pace comprehends the proper handling of machine

Harold R. Nissley received his Ph.B. from the University of Chicago in 1925. Since then he's taught at Kent State University, Miami University and Texas Technological College. For eight years he was Industrial Engineering Consultant to G-E at Nela Park, Cleveland, Ohio. He was sole arbiter on production standards dispute, Am. Steel & Wire Co. vs. United Steelworkers of America (CIO); sole arbiter, jurisdictional and disciplinary disputes, United Steelworkers of America vs. Electro Metallurgical Co. In 1952 he was on the arbitration panel, Federal Mediation and Conciliation Service. Since 1951 he has been a consulting engineer in Cleveland, Ohio.

". . . Keeping out of court.

and tools at the maximum pace that can be maintained over the working day without harmful effects. The correct pace is established by trained time-study observers, using as reference or standards the pace that experience over a long period on similar equipment and tools indicated is possible.

"Normal effort (i.e. normal incentive effort) then may be said to be that speed developed by an experienced operator previously selected from a normal labor market—a speed which can be maintained throughout an eight hour day without undue or cumulative fatigue. Such normal effort will be the same level of effort during war and peace—down south or up north—man or woman.

"There is too great a tendency to shift normal as the times and climate shift. When this is done, as much confusion results as when standard and daylight saving times are used."

Sounds like a college professor expounding on the variables that go into a fair day's work. Instead, however, these were the words used by an experienced and smart industrial engineering staff of a large company when presenting their work standards arbitration case before an arbiter who himself was an experienced industrial engineer.

There are several significant parts to this definition. First the definition starts with a "qualified employee." A week ago while time studying a light assembly operation I was compelled to rate one operator 50 per cent. Yet I was convinced this operator was putting forth the best possible effort he could muster for my observation. But the task required very good vision and this operator had poor vision. The job required a high degree of finger dexterity, yet this operator was clumsy (despite his two years of experience on the job). The job required above average intelligence, yet this operator was below average as reflected by his answers to certain of my questions. In short, this operator was not a "qualified employee" for that job; even the crudest types of aptitude and eye tests would have screened this operator out before he was put on the job. (But the company was "too busy to mess with such things as aptitude testing new operators.")

The second part of this definition ("the most effective use of effort") contains two thoughts: (a) The normal operator uses the proper methods and in the proper sequence; (b) the normal operator makes use of idle machine time or other delaying time, if at all possible, by doing other work. Now this is a sound and reasonable operating position to take. But let us turn, again, to the arbitration courtroom and see what happens when an informed arbiter starts asking questions about this simple and reasonable statement:

Arbiter: "Who establishes the proper methods and the proper sequence?"
Company: "The time study engineer(s) and/or the supervisor."
Arbiter: "How are these methods and their sequence conveyed to the operators?"

Company: "We tell them."
Arbiter: "Do the operators ever deviate from your instructions?"
Company: "Yes, frequently."
Union: "Mr. Arbiter, ask the Company if they disagree among themselves as to what is the proper method. Ask them if any two time study men or foremen ever instruct two new operators the same. Ask them if they carry all of these methods and proper sequence in their heads or if they ever follow a blueprint or some standard written instructions on a job."

Thus, it is not enough to insist that a normal operator use the proper methods and put these together in the proper sequence. Unless such methods and sequence are detailed on a "Methods Card" or standard written instruction sheet, a company is not in as strong a position when grievances arise.

The third part of the definition ("the most effective use of materials") is, perhaps, less subject to interpretation than the foregoing parts. But even here one may ask: "Who sees to it that the materials are on hand in the proper quantity and in the proper place and in the proper condition?" Is this the responsibility of the operator, the trucker, the foreman, or the apprentice? Or is the location, inspection, and timing of the materials the joint responsibility of all of these people? It would seem that the starting and ending points of responsibilities should be defined so that each interested party knows what is expected of him. Such a definition of responsibility, of course, does not have to be iron clad. It can begin with "In general the operator is expected to. . . ."

The fourth part of this definition ("the most effective use of equipment") is fairly complete and understandable. But what about the situation where a standard and fixed machine speed of 1200 an hour enables an operator to

". . . There are, today, two levels of effort and speed."

make his 15 per cent incentive when he turns out 8000 good units a day; then a machine designer overcomes some of the mechanical limitations and permits the machine to run at 2400 an hour and the operator can keep up with the machine and turn out 16,000 units a day—what about it? Should a new piece rate be established? Or should this operator be allowed to make double his job classification rate? Such situations should be covered in writing somewhere—either in the contract or at the time the original work standard was put into effect. Unfortunately, the pressure for a new job standard is generally so great that slow machine speeds and other considerations are either not recognized or not mentioned. Again, unfortunately, answers—embarrassing answers—to such details are frequently learned in the arbitration court.

The fifth part of this definition ("the normal incentive pace") is another well-stated section of the definition of a Normal Operator. Although the writer can't find much fault with this section he would like to focus the reader's attention on **incentive pace.**

There are, today, two levels of ef-

fort, speed, that are judged by time study engineers: (1) A low task or day-work level; (2) high task or incentive pace.

Low task or day-work pace. The low task level of effort or speed is one of the early methods of evaluating operator performance. The normal operator under these circumstances saunters along at a lackadaisical pace (of, say, three miles an hour for walking, or 40 words a minute for typing, or half a minute for dealing a deck of cards into four piles). At this pace he just makes his day rate. But when such an operator is put on incentive he is rewarded for "extra effort" because he increases his tempo (to, say, 4 miles per hour, or 53 words a minute, or one deal of 52 cards in one-third of a minute instead of one-half).

High task or incentive pace. The high task or incentive pace is, as indicated early in this article in the main definition, the "pace that can be maintained over the working day without harmful effects." Under this brisk pace concept the time study engineer sets a standard that is from 15 to 30 per cent higher than the day-work or low task standard. Thus the low task engineer may set a standard of 200 units an hour on a job where the day rate is $2.00 an hour; if there is a 15 per cent incentive differential on this job, the day work engineer will expect his day work operator to turn out 230 units per hour after the job has been put on piece work. The high task engineer does not even consider 200 units an hour as a fair hour's work; he insists that a minimum of 230 units an hour is a fair hour's work and 230 pieces per hour is his standard. When he prices the job, his piece rate will be 1c per unit (as in the day work example); and it should be that the operator will come out the same, financially, regardless of whether he was rated on a low task or a high task basis.

But why use two systems? Just as there are good reasons for using two systems of physical measurements (the British and the CGS systems) so there are good reasons why we have two levels of operator effort accepted by industry and industrial engineers today. The day work or low task system is, perhaps, a little easier to sell than the high task. In other words, it is a little easier to gain operator (and union) acceptance of a low task pace as being the pace of a "fair day's work" than the pace offered by someone really exerting himself. In substance, here is the line of reasoning: "You all know that you can do 200 units an hour; and we will accept 200 units an hour as a fair day's work. But we believe that some will want to exert themselves a little above this, 200 per hour level (without injury to themselves) and any who do so will receive extra compensation over and above a fair day's pay."

However, there is a gradual swing in the direction of the high task or brisk pace of operator performance by many of the leaders in American incentive practice. One of the chief reasons for this swing is the greater ease of pace recognition when people are performing at or near top speed. In other words, rating consistency is more easily achieved as the end point of

manual endurance and dexterity is reached (compared with the saunter-like gait of day work operators).

Thus our "simple" definition of a normal operator is anything but simple —if we are to be fairly accurate and if we are to keep out of trouble (i.e. out of debilitating grievance sessions and/or arbitration courts).

Out of this discussion, let us see if we can distil a definition that is better than any so far developed:

A normal (incentive) operator is a carefully selected and well-trained operator who exerts (consistently throughout an eight hour day) his maximum skill and effort without detriment to himself, his machine, or his product. Such a normal operator will earn the anticipated incentive differential on his job—no more, no less.

We could develop a similar definition for a low task or day work operator. Such a simple definition would contain some of the same ideas and might read like this: "A normal (low-task or day-work) operator is a carefully selected and well trained operator who exerts sufficient skill and effort to justify his day work pay." Weaknesses in the day-work concept of a fair day's work appear when such a definition is presented.

Rating the Time Study

A conventional time study consists of many parts. One important part is the elemental breakdown of the job. Each job is subdivided into job segments or elements such as: (1) Pick up part and position into press; (2) depress press pedal and wait for ram to stop moving; (3) remove part from press or "aside part."

The time study observer will note these logical job elements on his observation sheet. Opposite each element he will record his "observed times"—either by the snap back method or the continuous watch method of recording time study data. When he has sufficient

". . . assembling the qualified employee, job elements, materials, equipment and pace."

data he may leave the operator and the job without further ado. But the times he recorded may be slow or fast times. In other words, he may not have been watching a "normal" operator perform (if he did feel the operator was giving him a normal performance, then he would have rated the operator 100%).

Out of a group of carefully selected and well-trained operators, the chances are about 50-50 that the operator is a normal operator (really 44 out of 100). So as to bring observed times within the normal range, a time study observer either **rates** (or levels) each elemental observation, or the entire time study, during or after he is through making his observations.

"Rating is the mental process an industrial engineer goes through when he compares an operator's speed (and skill) of performance with the engineer's own concept of a 100 per cent operator. Although this normal effort concept remains fairly fixed, actual shop productions may vary considerably depending on a number of factors such as (a) changing conditions of the labor market and (b) caliber and concentration of supervision."*

Thus, rating is a judgment factor which the observer applies to his ob-

served times after making an appraisal of the operator's performance (i.e. skill and speed of the operator). The final times will differ from the observed times by these percentage or point appraisals. Thus, 10 per cent more time will be allowed to perform a given element if the recorded time is 0.10 minute and the observer has rated the operator 110 per cent for this element. When the observer rated this element 110 per cent he was judging the speed of performance of the operator with a "typical" or "average" or "normal" operator which he visualized. Hence, the 0.11 rated or standard time on this element would permit this operator to make 10 per cent more money (while performing this element) than the typical or normal operator who takes 0.11 minute to perform it.

Just as there are two concepts of normal operator today, so there are two main systems of rating today (plus a

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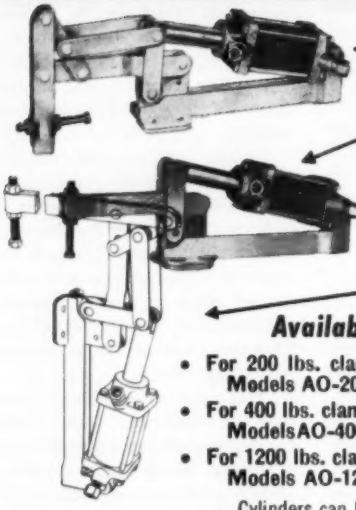

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few lesser ones). One of these systems is the old point ("B" or Bedaux) system based on a 60 minute hour. One point or "B" is equivalent to the skill and effort of a normal operator during one minute of time. Thus a normal operator will yield 60 B's or 60 units (or points) an hour. But here as elsewhere, the reader or the listener must be on his guard; because the old Bedaux system was based on low task performance, the typical operator was expected to turn in 80 B's an hour **after** he was put on incentive.

The other system that is in use today is the percentage system. A normal operator is a 100 per cent operator. An element that is rated 100 per cent means the observer will use the selected observed time as the final time in his calculations (any time multiplied by 100 per cent will yield the original time).

Unlike the point system described previously, the percentage system is used in both low-task and high-task

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performance ratings. So, again, it becomes necessary to relate final times and standards to the performance level of the observer or the plant. If work standards are **day work** standards, then a normal operator is rated 100 per cent who is just "coasting along." If work standards are predicated on high task or incentive levels, then only those operators or elements which meet the high task concept of the observer are rated 100%; but as pointed out previously, unusually fast operators even under a high task rating situation may be rated 110, 120, or even 130 per cent. Such a 130 per cent operator would be very rare and would be rated by a low task observer as a 173 per cent operator or 104 point performer by the point system engineer).

Thus an observed time of 0.30 minute of a 130 per cent (high task) operator becomes a final rated time of 0.39 minutes (0.30 times 1.30). But this same observed time of 0.30 minute becomes

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What Do You Want to Know About Time Study and Incentives?

In April of this year BLUE BOOK'S Editorial Board met with Mr. Nissley and "spelled out" for him the kind of questions the readers of the BLUE BOOK would like to have answered in a series of time study articles. It will, of course, be impossible to cover all of these questions in four short articles—unless Mr. Nissley devoted his entire energies to a series of question-and-answer articles. We will, therefore, concentrate on those questions which you, the reader, are particularly interested in. You may check the ones below, suggested by our Board, which **you** would like to have answered and return this page to the Editor of MACHINE and TOOL BLUE BOOK, Wheaton, Illinois. Mr. Nissley will answer as many of these questions as time and space will permit.

1. Is there any incentive system that can be applied to job shop operation? _____
2. What are the supervisor's responsibilities for sound incentives? _____
3. Is there any incentive for a supervisor to administer an incentive plan? _____
4. What is the best method for levelling? _____
5. What assurance do you have that the operator will perform the job as it is studied? _____
6. How do you balance the line when several units or models are going down the line at one time? _____
7. How do you keep time studies up-to-date? _____
8. When is the job ready to be time studied? _____
9. What is a normal operator? _____
10. What do you do with the older marginal operator who becomes the bottleneck in a production line or group incentive pool? _____
11. How do you handle scrap or shrinkage? _____
12. How do you show the benefits of a sound standards program to the operators and the union? _____ How do you indicate to the operator that he has contributed a fair day's work for a fair day's pay? _____ How do you prove that time study will equalize the work load distribution for everyone? _____
13. How do incentive systems stand up in courts of arbitration? _____
14. What are the advantages and disadvantages of an incentive system to an employer? _____
15. What are the pitfalls of an incentive system? _____
16. What happens when short-run jobs come back in long runs? _____
17. What is the maximum methods change that can be allowed before a job can be re-timed? _____
18. How can you tell when an operator is trying to fool the time study man? _____
19. What are proper allowances? _____
20. What are the "legal" methods changes that will permit a rate to be changed? _____
21. How much and what kind of training is needed by foremen to administer an incentive and time study program within their respective departments? _____
22. What is the best background for time study engineering talent—above average shop hands, college graduates, supervisory talent? _____
23. What provision do you make for new operators or learners to make the rate? _____
24. What are the merits of individual and group incentive? _____ Which one do you consider better? _____
25. What are the proper fatigue allowances? _____
26. How do you handle unavoidable delay allowances? _____

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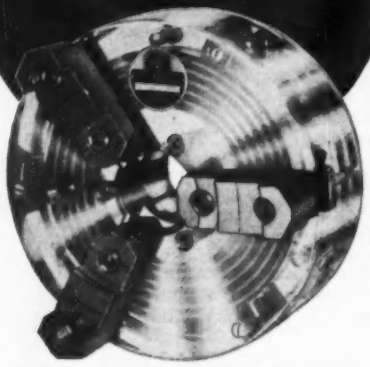

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0.52 minute when levelled by the low task point observer (0.30 min. times 104/60).

Conclusions

An accurate and fair statement of a "normal" operator is not simple nor can it be wholly objective. At best a normal operator is a carefully selected and well-trained operator—not just any operator who happened to come along the day the labor requisition came through. A normal operator will exceed day work standards set on his job by amounts which may vary from 15 to 30 per cent. The same normal operator will just equal standards which are set at high task or incentive levels.

Rating, a highly subjective factor in time study work, can be defined as "the mental process an industrial engineer goes through when he compares an operator's speed (and skill) of performance with his own concept of a 100 per cent (or 60 point) operator."

* * *

Editor's Note: In the next issue of the BLUE BOOK Mr. Nissley will show, step by step, how he makes a time study. He will show, too, how to minimize the controversial judgment factor of rating by the development of standard (check) data.

End of Part 2

Tin Plate Data

Net weight per box tin plates

Trade Term	80-lb.	85-lb.	90-lb.	95-lb.	100-lb.
Nearest U. S. Gauge	33	32	31	31	30½
Decimal Equivalent	.008	.009	.010	.010	.012
Weight, Sq. Ft., Lbs.	.367	.390	.413	.436	.459
Weight per Box, Lbs.	80	85	90	95	100

Size of Sheets	Sheets per Box	Pounds				
10 x 14	225	80	85	90	95	100
14 x 20	112	80	85	90	95	100
20 x 28	112	160	170	180	190	200
10 x 20	225	114	121	129	136	143
11 x 22	225	138	147	156	164	172
11½ x 23	225	151	161	170	179	189
12 x 12	225	82	87	93	98	103
12 x 24	112	82	87	93	98	103
13 x 13	225	97	103	109	115	121
13 x 26	112	97	103	109	115	121
14 x 14	225	112	119	126	133	140
14 x 28	112	112	119	126	133	140
15 x 15	225	129	137	145	153	161
16 x 16	225	146	155	165	174	183
17 x 17	225	165	175	186	196	206
18 x 18	112	93	98	104	110	116
19 x 19	112	103	110	116	122	129
20 x 20	112	114	121	129	136	143
21 x 21	112	126	134	142	150	158
22 x 22	112	138	147	156	164	172
23 x 23	112	151	161	170	179	189
24 x 24	112	164	175	185	195	204
26 x 26	112	198	205	217	229	241
16 x 20	112	91	97	103	109	114
14 x 31	112	124	132	140	147	155
11¼ x 22¾	112	73	78	82	87	91
13¼ x 17¾	112	67	71	76	80	84
13¼ x 19¼	112	73	77	82	87	91
13½ x 19½	112	75	80	85	89	94
13½ x 19¾	112	76	81	86	90	95
14 x 18¾	124	83	88	93	98	103
14 x 19¼	120	83	88	93	98	103
14 x 21	112	84	89	95	100	105
14 x 22	112	88	94	99	105	110
14 x 22¼	112	89	95	100	106	111
15½ x 23	112	102	108	115	121	127

M & H Sheet Zinc Gauge

Gauge No.	Thickness, Inches	Gauge No.	Thickness, Inches	Gauge No.	Thickness, Inches	Gauge No.	Thickness, Inches
1	0.002	5	0.010	9	0.018	13	0.032
2	0.004	6	0.012	10	0.020	14	0.036
3	0.006	7	0.014	11	0.024	15	0.040
4	0.008	8	0.016	12	0.028	16	0.045

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Nearest U. S. Gauge	30	28	28	26½	25½	25
Decimal Equivalent	.012	.014	.014	.016	.018	.020
Weight, Sq. Ft., Lbs.	.491	.588	.619	.712	.803	.895
Weight per Box, Lbs.	107	128	135	155	175	195

Size of Sheets	Sheets per Box	Pounds					
10 x 14	225	107	128	135	155	175	195
14 x 20	112	107	128	135	155	175	195
20 x 28	112	214	256	270	310	350	390
10 x 20	225	153	183	193	221	250	279
11 x 22	225	184	222	234	268	302	337
11⅓ x 23	225	202	242	255	293	331	368
12 x 12	225	110	132	139	159	180	201
12 x 24	112	110	132	139	159	180	201
13 x 13	225	129	154	163	187	211	235
13 x 26	112	129	154	163	187	211	235
14 x 14	225	150	179	189	217	245	273
14 x 28	112	150	179	189	217	245	273
15 x 15	225	172	206	217	249	281	313
16 x 16	225	196	234	247	283	320	357
17 x 17	225	221	264	279	320	361	403
18 x 18	112	124	148	156	179	202	226
19 x 19	112	138	165	174	200	226	251
20 x 20	112	153	183	193	221	250	279
21 x 21	112	169	202	213	244	276	307
22 x 22	112	184	221	234	268	302	337
23 x 23	112	202	242	255	293	331	368
24 x 24	112	220	263	278	319	360	401
26 x 26	112	258	309	326	374	422	471
16 x 20	112	122	146	154	177	200	223
14 x 31	112	166	198	209	240	271	302
11¼ x 22¼	112	98	....	....	....	....	....
13¼ x 17¾	112	90	....	....	....	....	....
13¼ x 19¾	112	97	....	....	....	....	....
13½ x 19½	112	100	....	....	....	....	....
13½ x 19¾	112	102	....	....	....	....	....
14 x 18¾	124	110	....	....	....	....	....
14 x 19¼	120	110	....	....	....	....	....
14 x 21	112	112	....	....	....	....	....
14 x 22	112	118	....	....	....	....	....
14 x 22¼	112	119	....	....	....	....	....
15½ x 23	112	136	....	....	....	....	....

Weight in Pounds per Sq. Ft. of Zinc Plate

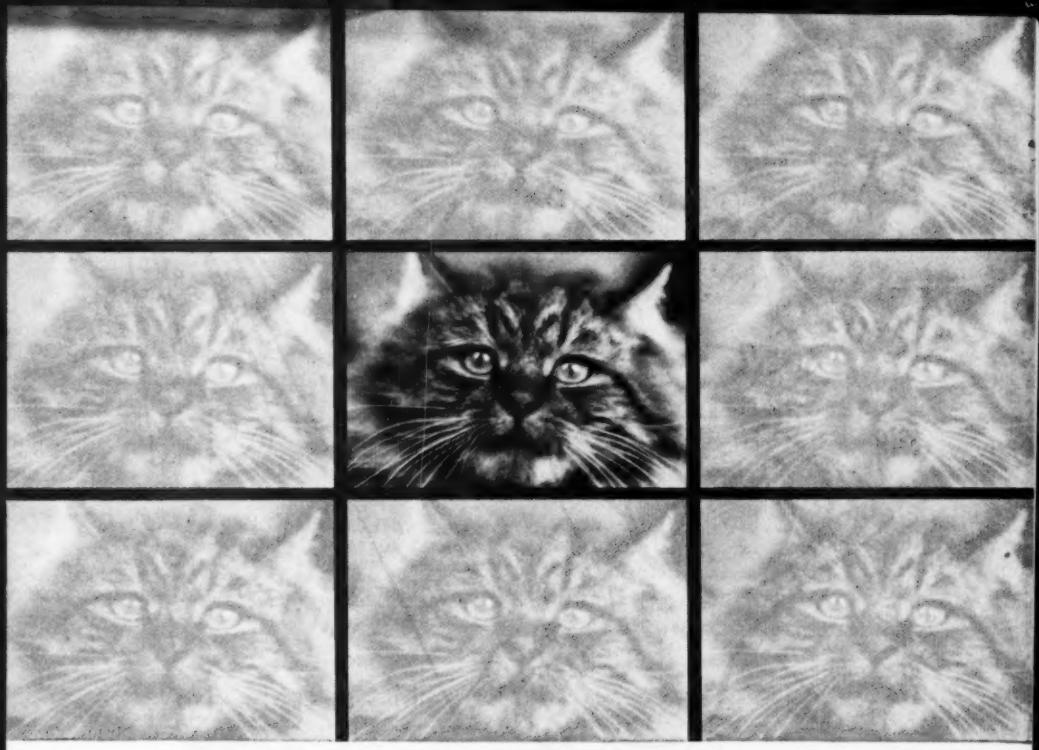
Gauge No.	Weight in Pounds per Sq. Foot	Gauge No.	Weight in Pounds per Sq. Foot	Gauge No.	Weight in Pounds per Sq. Foot	Gauge No.	Weight in Pounds per Sq. Foot
1	0.07	5	0.37	9	0.67	13	1.20
2	0.15	6	0.45	10	0.75	14	1.35
3	0.22	7	0.52	11	0.90	15	1.50
4	0.30	8	0.60	12	1.05	16	1.68

Weights of Copper, Brass and Aluminum Sheets

Brown & Sharpe Gauge	Decimal Thickness Inches	Weight of Sheets, Pounds per Square Foot		
		Copper	Brass	Aluminum
1	.289	13.10	12.38	3.94
2	.258	11.67	11.03	3.52
3	.229	10.39	9.82	3.14
4	.204	9.25	8.74	2.78
5	.182	8.24	7.79	2.48
6	.162	7.34	6.93	2.21
7	.144	6.54	6.18	1.97
8	.128	5.82	5.50	1.75
9	.114	5.18	4.90	1.56
10	.102	4.62	4.36	1.39
11	.091	4.11	3.88	1.24
12	.0808	3.66	3.46	1.11
13	.0720	3.26	3.08	.985
14	.0641	2.90	2.74	.875
15	.0571	2.59	2.44	.784
16	.0508	2.30	2.18	.694
17	.0453	2.05	1.94	.620
18	.0403	1.83	1.72	.552
19	.0359	1.63	1.54	.492
20	.0320	1.45	1.37	.437
21	.0285	1.29	1.22	.390
22	.0253	1.15	1.08	.347
23	.0226	1.02	.966	.308
24	.0201	.911	.860	.276
25	.0179	.811	.766	.245
26	.0159	.722	.682	.218
27	.0142	.643	.608	.194
28	.0126	.573	.541	.173
29	.0113	.510	.482	.154
30	.0100	.454	.429	.137
31	.0089	.404	.382	.122
32	.0080	.360	.340	.109
33	.0071	.321	.303	.097
34	.0063	.286	.270	.087
35	.0056	.254	.240	.077
36	.0050	.226	.214	.068
37	.0045	.202	.191	.061
38	.0040	.180	.170	.054
39	.0035	.160	.151	.048
40	.0031	.142	.135	.043

Weight, One Sq. Ft. of Metals

Thickness	Wrought Iron	Cast Iron	Steel	Copper	Brass	Lead
in.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1/16	2.50	2.34	2.55	2.89	2.63	3.71
1/8	5.00	4.69	5.10	5.79	5.26	7.41
3/16	7.50	7.03	7.65	8.68	7.89	11.1
1/4	10.0	9.38	10.2	11.6	10.5	14.8
5/16	12.5	11.7	12.8	14.5	13.2	18.5
3/8	15.0	14.1	15.3	17.4	15.8	22.2
7/16	17.5	16.4	17.9	20.3	18.4	25.9
1/2	20.0	18.7	20.4	23.2	21.1	29.7



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Excessive heat is destructive to cutting tools, shortens their life. But CIMCOOL increases tool life—and permits faster speeds—because this revolutionary coolant cools faster, through a unique physical change in the cutting fluid itself. Tools and chips actually stay cool to the touch.

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for 85% of all metal cutting jobs

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

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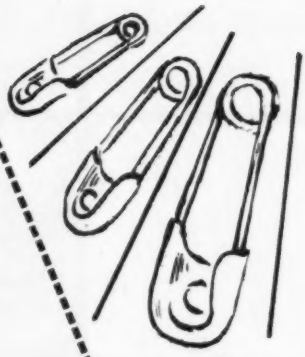

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Center Hole Drilling Attachment For Small Drill Presses

By **H. J. Gerber**

THE OPERATION OF DRILLING center holes in a shaft, preparatory to turning between centers in a lathe, can be done most efficiently in a drill press. However, most small drill presses are not equipped with the necessary attachment for this job. A simple attachment, which will not interfere with the normal operation of the drill press, can be easily made.

The adjustable support bracket of this device can be welded and machined from

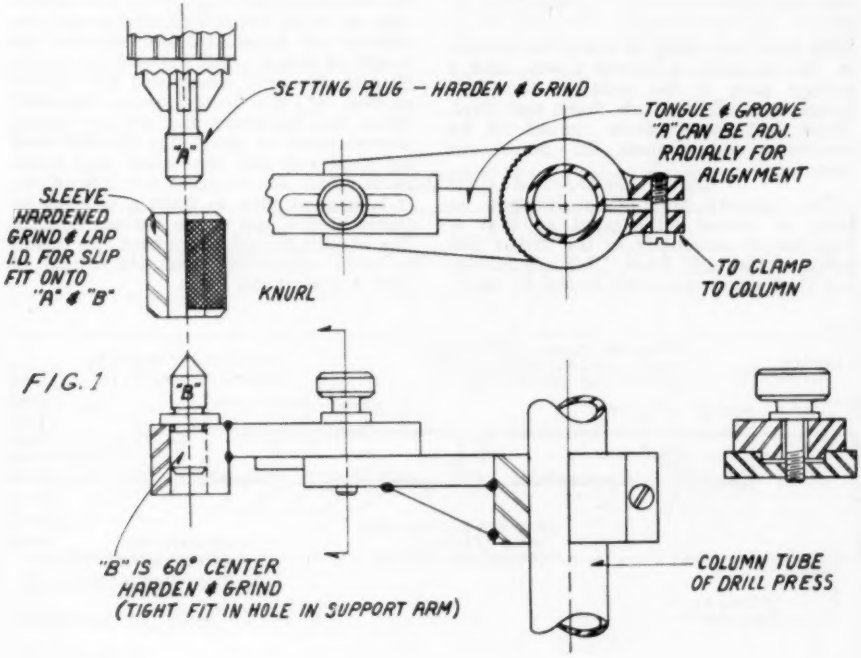

SETTING PLUG – HARDEN & GRIND
TONGUE & GROOVE "A" CAN BE ADJ. RADIALLY FOR ALIGNMENT
"A"
SLEEVE HARDENED GRIND & LAP I.D. FOR SLIP FIT ONTO "A" & "B"
KNURL
TO CLAMP TO COLUMN
"B"
"B" IS 60° CENTER HARDEN & GRIND (TIGHT FIT IN HOLE IN SUPPORT ARM)
COLUMN TUBE OF DRILL PRESS

FIG. 1

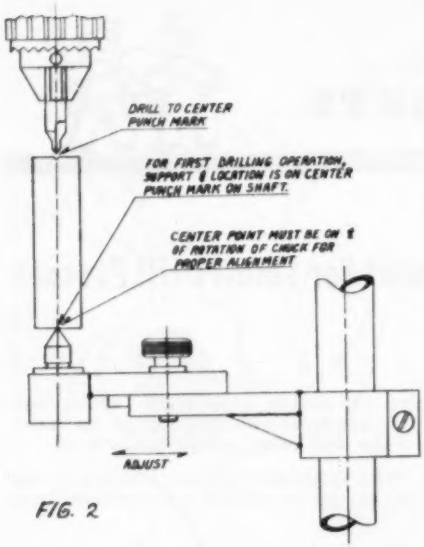

DRILL TO CENTER PUNCH MARK
FOR FIRST DRILLING OPERATION, SUPPORT & LOCATION IS ON CENTER PUNCH MARK ON SHAFT.
CENTER POINT MUST BE ON ℄ OF ROTATION OF CHUCK FOR PROPER ALIGNMENT
ADJUST

FIG. 2

mild steel bar stock. A center to be held in this bracket, a setting sleeve, and a setting plug to be held in the drill chuck, can all be made from tool steel. These last three pieces should all be hardened and ground for permanent accuracy.

The support bracket is designed to have a radical adjustment so that it may be set accurately to the throat distance of the drill press. This adjustment can then be permanently locked in place.

The setting plug "A", figure 1, is held in the drill chuck. The gaging diameter of this plug is exactly the same as the body diameter of the 60° center support "B". A hardened, ground, and lapped sleeve is made to fit snugly onto these two pieces.

When all of the above three pieces are aligned, the setting plug and sleeve are removed and a combination drill and countersink is inserted in the chuck. The work is then supported on a center punch mark on the end of the work piece for the first operation. For the second operation the work is supported on the first drilled center hole.

The whole device is simply swung out of the way when you desire to return the drill press to normal drilling work.

When shafts which are longer than the quill travel of the drill press are to be centered it will be necessary to use an extra setting sleeve and a length of drill rod to assist in bringing the drill chuck and the lower support unit of the device into alignment. As figure 3 illustrates, the two sleeves act as connectors between the length of straight drill rod and the setting plug in the drill chuck and the outside surface of the lower center support. These two hardened and ground setting sleeves must be snug slip fit onto both the drill rod and the upper and lower units which are brought into alignment. It is a good idea to have a number of pieces of drill rod cut to various lengths. The lengths should vary about two inches or more, depending upon the length of quill travel of the press.

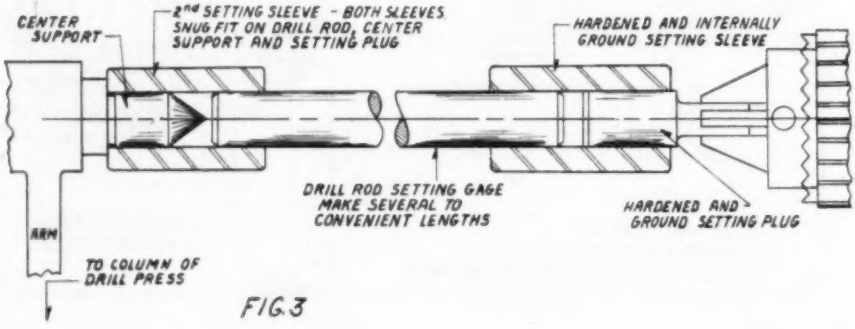

CENTER SUPPORT
2nd SETTING SLEEVE - BOTH SLEEVES SNUG FIT ON DRILL ROD, CENTER SUPPORT AND SETTING PLUG
HARDENED AND INTERNALLY GROUND SETTING SLEEVE
DRILL ROD SETTING GAGE MAKE SEVERAL TO CONVENIENT LENGTHS
HARDENED AND GROUND SETTING PLUG
ARM
TO COLUMN OF DRILL PRESS

FIG. 3

Design, development record of cutting tools saves time

By **Harold D. Rhodenbaugh**

With the introduction of carbides into the metal working industry, it fast became apparent that tool grinding or tool sharpening should be specialized and confined to skilled cutter grinders.

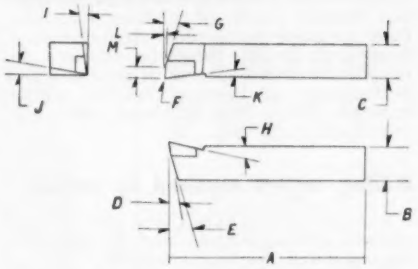
However, before a cutting tool can be economically ground and stocked it must be designed and developed.

Here is a tool development form used to establish the correct grades of carbides and the correct tool geometry, from standing cutting tool blanks.

A tool is introduced to an operation on a blueprint of a sketch showing style, radius, coolant, date ground, RPM, feed, holder, material, etc. Dimensions are red-pencilled in. Each alteration is shown. In other words, the development of the tool takes place over this sketch. The result of each change is recorded.

When a tool is introduced into production over a development sketch, there is a very real reason for its present existence, a record of its performance.

After the tool has been developed, all pertinent information relative to the tool should be transferred to a blue-



print of the developed tool and no deviation from that print should be permitted except through the introduction of new technique or material change. The tool development print should be filed for reference.

At this point a production minded person might say, "This is too much red tape." To that person I would answer, "There are probably more lost man hours in perpetrating the out-moded cut and try method of tool grinding than in any other phase of industrial activity." This

TOOL NO.

MACHINE NO.

R.H. **TURNING & FACING TOOL**

A	B	C	STYLE	TOOL NUMBER	883	78B	78	D	E	RADIUS F	G	H	I	J	K	L	M

PART NO. **OPR. NO.**

Date Ground	Coolant	Material	RPM	Feed	Opr.	Pieces	Rockwell	Tool Holder

REQUESTED AT, TIME:

RECEIVED AT, TIME:

INITIATED BY:

is especially true in aircraft work.

For example, take nitralloy, nickle iron, stainless steel, aluminum bronze and certain kinds of plastics. Consider their peculiar machining characteristics. Now consider the machine operator or jobsetter with no records of previous tool performance of these diversified metals trying to turn, form or trepan with just "standard tools."

Milling cutters repaired by welding

Temco Aircraft Corp. is putting cracked milling cutters back in operation the same day they are damaged.

The Dallas, Tex., firm has found that major repair on these high carbon tools can be a routine maintenance operation. The only requirements are these: a few special fixtures, correct welding equipment and an above-average welder.

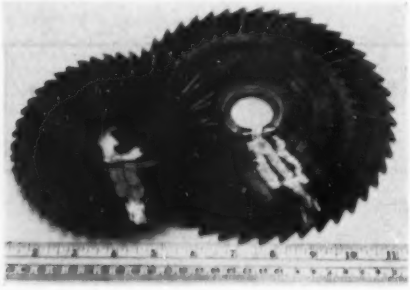
Savings from a cutter repair program are great, since milling cutters, which range in price from $30 to several hundred dollars, normaly are scrapped after damage.

Cutter cracks usually result from milling machines feeding too fast, or biting too deep. In cases where matched cutters were used in pairs, a perfectly sound cutter had to be discarded if its twin was damaged.

Temco's cracked cutters now are routed to Maintenance Department Welder William P. Alberts.

Alberts first fits together the two pieces of a broken circular cutter on a simple fixture he made of surface-ground boiler plate. This fixture merely serves as a level platform on which broken cutter pieces can be reassembled accurately.

When fit and alignment are perfect, Alberts secures the pieces with C-clamps and tacks them in two places with an electric arc, using a No. 680 Electrode, a high alloy, steel product made by Eutectic Welding Alloys Corp.



This joins the pieces sufficiently so that the complete cutter can be placed on a 7"-by-¼" Carborundum wheel. Alberts grinds a deep groove along the crack, first on one side of the cutter, then on the other. The groove allows Alberts to get as close to a 100 per cent weld as possible.

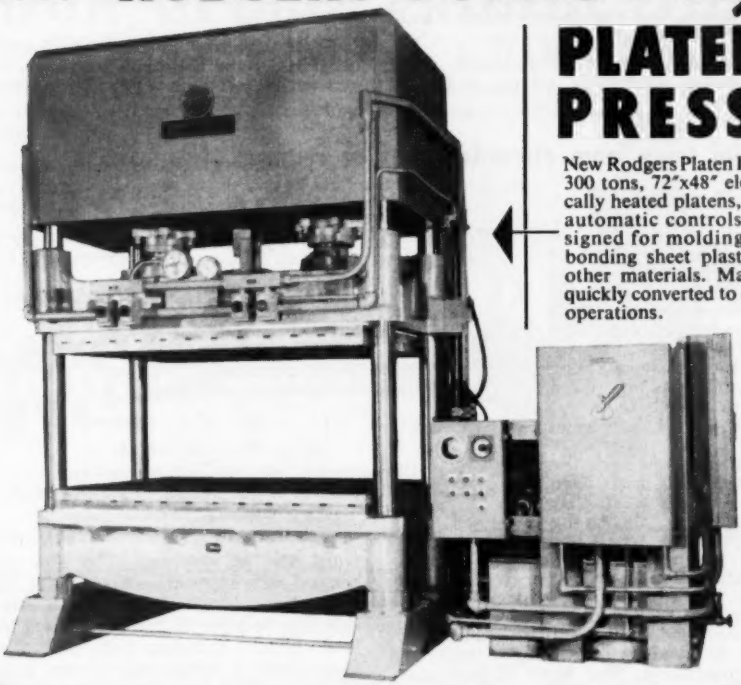
Tacked and grooved, the cutter is placed in another fixture for pre-heating and welding. This device consists of two steel rings, cut from 10" ID pipe. The cutter is placed between the rings which are tightened by means of four ½"-by-4" bolts. Four smaller bolts, attached to steel cross-pieces in each ring, are screwed tight against the cutter, sandwiched inside, further securing it.

Alberts pre-heats both fixture and cutter to about 700°. He welds with Eutectic's 680 Electrode and between tacks, he heats the work with a No. 7 tip on an oxygen-acetylene torch.

During many months of experimentation, Welder Alberts arrived at several safeguards against further cracking damaged cutters during welding. He recommends:

1. Welding from the inside (hub) of the cutter to the outside (cutting edge).
2. Keeping an equal amount of weld on both sides of the groove, and keeping the arc as close as possible to the center of the groove.
3. Getting the torch flame on the work immediately after each tack is made.
4. Keeping the weld balanced. For example, if the crack runs completely across

New RODGERS *"Double Duty"*



PLATEN PRESS

New Rodgers Platen Press, 300 tons, 72″x48″ electrically heated platens, with automatic controls, designed for molding and bonding sheet plastic to other materials. May be quickly converted to other operations.

1 **forms or draws metals**

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Heated platens, which mold sheet plastic *and* simultaneously bond it to metal, rubber or other materials, are interchangeable with metal forming or drawing dies. By using pneumatic die cushions, the press can be converted for deep drawing of metals.

Rodgers "Double Duty" Presses are available in 10 to 500-ton capacities and with platen sizes from 12″x12″ to 72″x48″. Precision control equipment automatically governs platen movement, pressure, time cycles and temperature. Operator safety is assured by equipment design.

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the cutter, he welds briefly at one extremity, then switches to the other. By alternating in this fashion until the weld is complete, he avoids too much "pull' at any one point.

The welding operation requires about 30 minutes, excluding set-up and preheating time. Alberts then normalizes cutter temperature and places the tool, still in its fixture, on edge inside a box to cool.

When cooling is completed and the weld is ground flush with the cutter surface, the tool is ready for service.

Special tools from discarded taps or reamers

By **A. E. Salmons**

Special tools can be made from broken or discarded pipe taps as well as special reamers. Illustrated are two tools we made for our own use. They save time, cut costs, increase production and quality. They are easy to grind to shape desired on a universal grinder. These tools were an improvement over the flat tools we had been using as they had only two cutting points. As the accompanying drawing shows, the tools are made from 1¼ pipe taps and have five flutes and cutting edges. The edge of each cutting point is similar to a drill and backed off to provide clearance. Flutes can be ground any radius or straight according to material to be machined. The front of tool lead is similar to the lead on taps or it can be ground similar to an end mill. Tools can be resharpened many times both at front and at step cut. The step cut is backed off approximately 7° for clearance. It is suggested that you use the size tap nearest to the work you intend to do to save grinding time. One of these tools took 4 hours, the other 6 hours to make. This is considerably less time than it would take to make a new one and naturally it is already hardened.

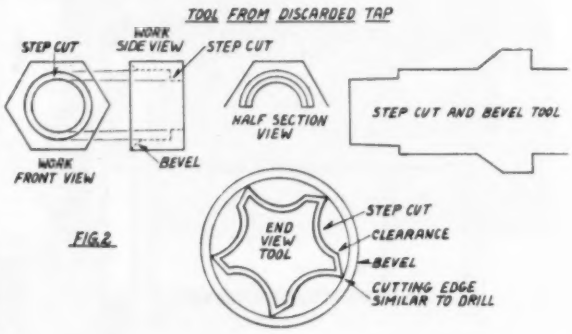

FIG. 2

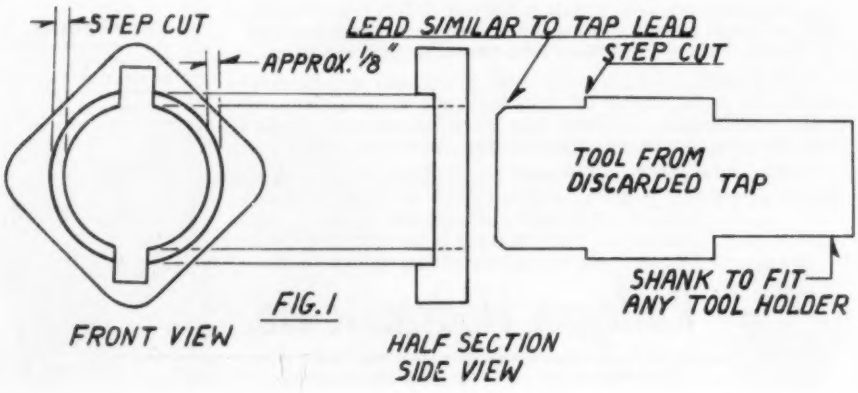

FIG. 1

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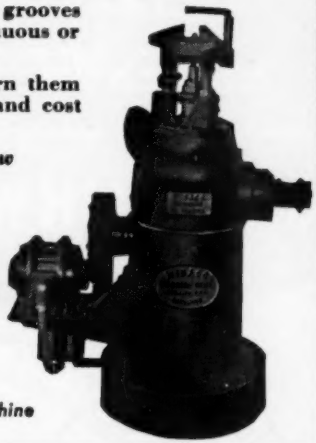

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What time is it?

By **William E. Donovan**

Telling time isn't very complicated when the incentive system used in the shop is based on our standard of 60 seconds to a minute and of 60 minutes to an hour.

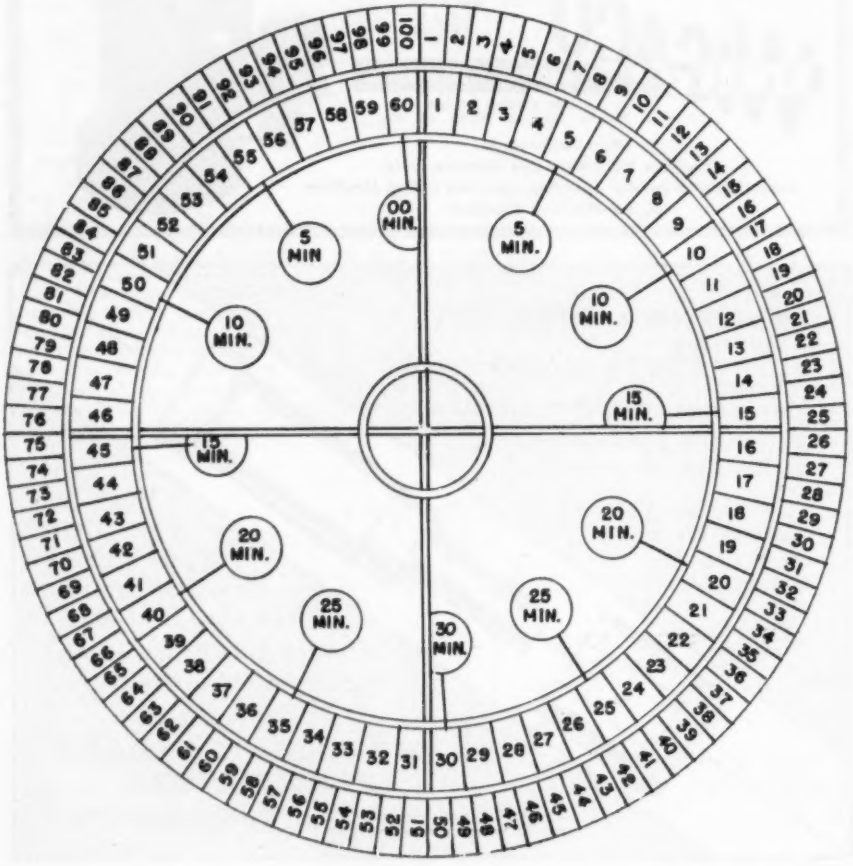
But the catch comes when an incentive system is based on the assumption of 100 parts to the hour, rather than sixty. So the time on the job card reads .33 and you've got to beat that time.

This is particularly true when the work is all drill work. Short jobs of set-screwing have small amounts of time on each job, and it's the gain on each job that adds up.

To a person who has worked on the production line under the "old fashioned" system of 60 minutes to an hour, it becomes quite confusing to be handed a card with .66 time on it and be able to figure out quickly how soon you've got to get that job finished to make your profit.

Most systems figure a 33 1/3% margin for the production man to benefit on time placed on a job. Now take this .66 time job, deduct your 1/3 and you have .44 time left, which means that .44 from now this particular job must be finished in order to make your bonus.

All well and good, but how many



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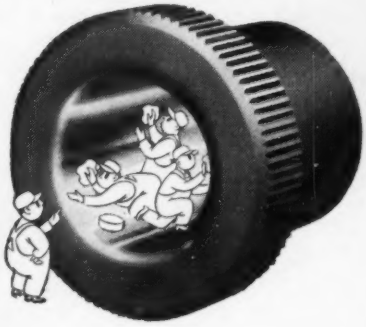

One sure way to cut excessive tool wear in your operations is to specify Universal Drill Bushings because their superfinish bores help reduce wear on production tools to an absolute minimum, especially in close tolerance work. The blended radius on the top inside diameter helps prevent tool hang-up and breakage. 100% concentricity and hardness tests insure accuracy, uniform high quality and long life. Knurled heads provide a quick, sure grip. Universal Drill Bushings are produced in a complete range of standard sizes and lengths. Orders for special dimensions will receive prompt attention. For complete information, write to the office nearest you—Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Ave., Kenosha, Wis.—or our home office.

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minutes do .44 equal? You still have to look up at the old clock on the wall and figure out when you're supposed to be off that job. I have drawn a clock which tells at a glance how many minutes .44 time really is.

The clock shows you a circle with the sixty numerically numbered divisions on the inside circle and directly opposite these divisions of minutes on the outside circle are 100 numerically numbered divisions placed against the same circle.

For an example, let's go back to our original problem of the .66 time job. Say the man punched in at quarter after eight, (8.25) minutes and he's counting on his third for bonus, so that leaves him .44 to do the work in. All the man has to do is add the .44 to the time punched on the card. Most clocks punch in hundredths (but the dial still reads minutes), so the quarter after eight punch reads 8.25, add .44 which gives you 8.69, the time in which the job must be completed in order to make out.

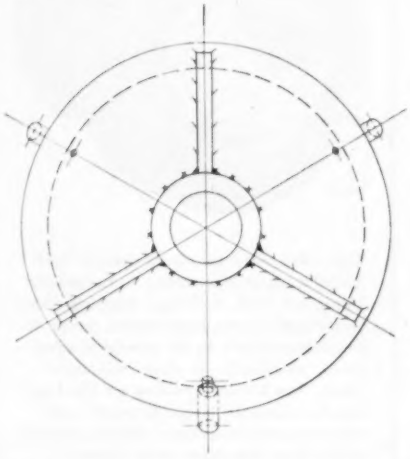
And a glance at our double circle clock shows 8.69 is close to 18 minutes of nine.

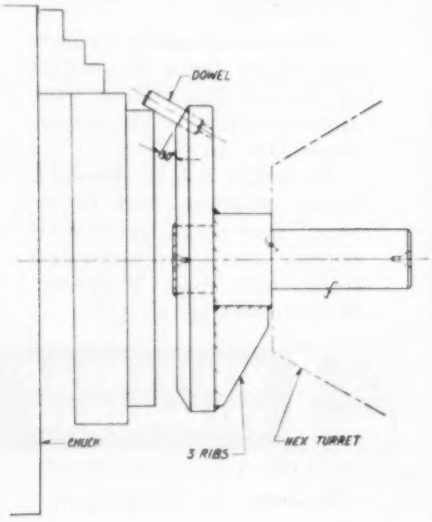
Large center facilitates chucking rough work

By **Roger Isetts**

When chucking large rough work on a turret lathe in a three jaw chuck, it is often difficult and time consuming trying to centralize the piece and manipulate the chuck wrench all at the same time. Illustrated is a sturdy female type center that will greatly facilitate the chucking operation and reduce operator fatigue.

A large round piece of machine steel is welded to a round shank. Three ribs equally spaced are welded on for stiffening purposes. The weldment is then machined between centers. A 30° angle is turned on the outer edge. Three dowel pins are pressed in 120° apart around





the periphery. The shank is turned down to a slip fit in the hex turret.

In use, the operator places the work loosely in the chuck jaws. He then runs the turret up until the dowels contact the work. The jaws are then tightened thus assuring centralization of the work piece. The turret is then backed off and indexed to the next station.

Press tie rods

By **W. C. Betz**

In order to fit tie rods to presses care must be exercised to prevent them from springing the ram face in relation to the platen.

As one of the best ways to assure non-springing, a dial gage is mounted at the front of the press between the ram face and the platen and the dial set to zero.

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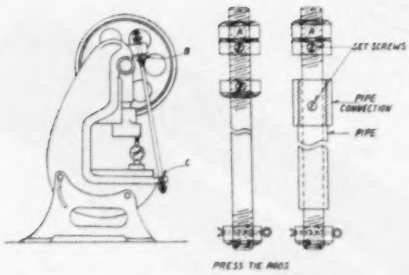


Two methods are available to accomplish this.

If you use a rod alone springing can be prevented by tightening the nut on the top until the dial needle starts to move then tighten check nut A, to bring it back to zero, then lock set screw. This locks the rod and nuts against vibration.

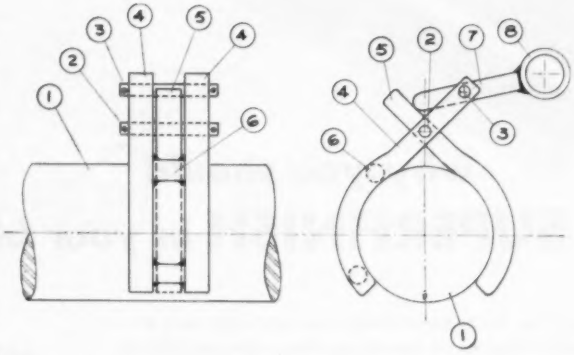
To use the rod in conjunction with pipe and threaded fittings which are brought up tight to the under side of casting lug B, making sure that the zero is maintained on the gauge, the fitting is also locked from loosening by set screw. In either case the rods and nuts are locked on the lower end by cotter pins.

Solid length pipe cannot be fitted properly between faces B and C, because these faces are generally not machined and the distance between them varies to a great extent.

Safety hook for heavy shafts

By **Roger Johnson**

When handling larger shafts in and out of lathes, conventional slings proved too slow and cumbersome. To provide a safe and fast means of doing this loading and unloading a special self-locking hook was made as shown here:



Two bars (4) were bent to a radius slightly smaller than that of the shaft. They were drilled for hinge pins (2) and (3) and welded together with two spacers (6). Another bar (5) was bent similarly and also provided with a hole for hinge pin (2). A third bar (7), welded to a length of tubing (8), rounded off on its other end and drilled for hinge pin (3) serves as a lock as the load is lifted from the floor. (Ring 8 is for the hoist hook). When the load is safely within the lathe centers, the hoist hook is lowered, bar (7) unlocks itself and the tongs are free to be opened and removed.

Suggestion for handy receptacle, applicator for copper-sulfate solution

By **Federico Strasser**

The way to put copper-sulfate solution on steel surfaces previous to a lay-out operation had always represented a problem until I found the following:

Take a small bottle with a screw-cap in which a small brush is fastened—(a discarded paste-bottle commonly used for gluing paper, etc., is o.k.). After having cleaned it thoroughly, fill it with concentrated solution of copper-sulfate. Apply by means of a soft brush.

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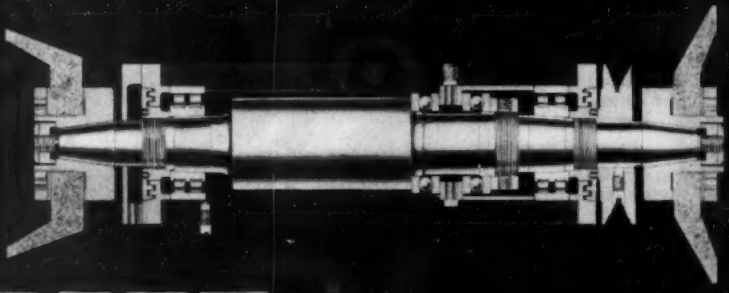

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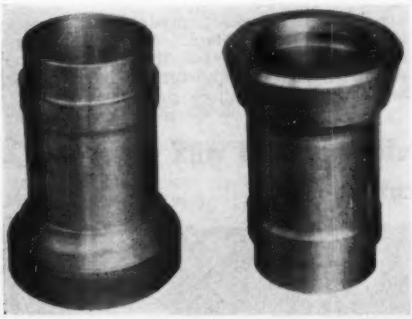
Collet Job Time Cut on the 12" Universal Model MC Acme-Gridley Single Spindle Automatic Chucker

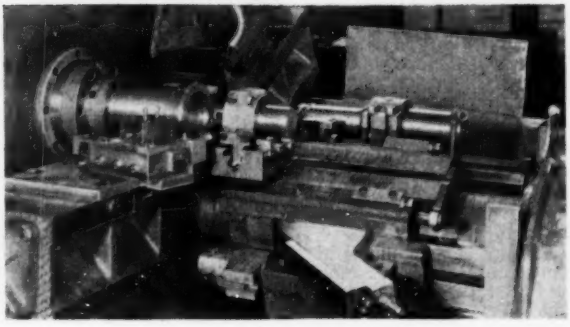
SEVERAL COLLET blank jobs have been run on the 12" Universal. These are solid and master collet blanks for use on Acme-Gridley multiple and single spindle bar automatics.

First operation setups on these are particularly tough jobs involving heavy drilling, because a solid slug of 4150 special collet steel is used. Tooling included both carbides and high speed steel tools.

Incorporating the various operations into



Semi-finished master collet blank machined on 12" Universal Model MC Acme-Gridley single spindle automatic chucker. First operation setup performs 14 machining cuts to complete one end of collet from SAE-4150 steel slug as shown at left. Nine cuts are made in the second operation setup to complete other end of workpiece as shown at right. In each setup, all machining cuts are performed in an automatically controlled machining cycle at a predetermined rate which is the same at the end of a shift as at the start. Floor to floor time for completing the blank to this point on the new chucker is 3 times as fast as by previous methods.



Closeup of tooling on 12" Universal Model MC Acme-Gridley single spindle automatic chucker for performing 9 machining cuts in second operation setup on master collet blank. Automatically controlled machining cycle performs these operations nearly 4 times as fast (floor to floor time) as previous methods used.

Comparison Chart

Job	Number of Operations	Floor to Floor time (minutes)	
		Model MC	Former Method
Master Collet			
6" diam. x 8"			
1st operation	14	24.3	56.0
2nd operation	9	11.1	42.0
Solid Collet No. 1			
6" diam. x 8"			
1st operation	14	24.3	56.0
*2nd operation	—	—	—
Solid Collet No. 2			
6" diam. x 8"			
1st operation	14	18.0	53.0
2nd operation	5	7.2	24.0

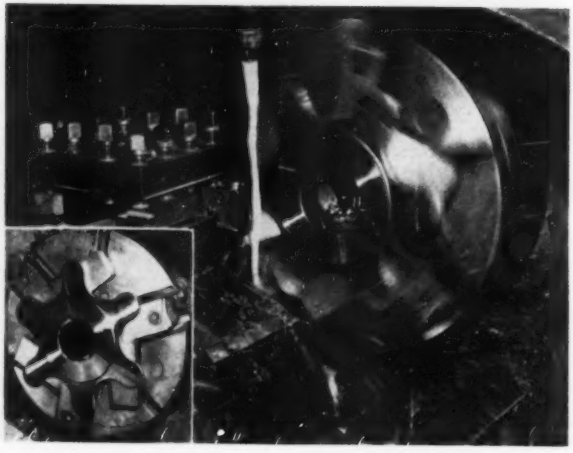
**Not run on Model MC as yet*

an automatic machining cycle, which included automatic speed changes to insure maximum tool efficiency and highest precision for each cut, the new Model MC Acme-Gridley single spindle chucker operated in an exact, predetermined cycle time piece after piece. As a result, the floor to floor time for the new chucker averaged very nearly three times as fast as that of the methods previously used.

Heat-treated steel forgings successfully machined with tooling despite severe interrupted cutting

Interrupted cutting of hard, tough, heat-treated SAE 4340 alloy steel (220,000 pounds per square inch tensile strength) forgings is currently being handled at an increased speed and with over ten times longer tool life by a switch from standard brazed carbide tools to Kennamatic sintered tungsten carbide triangular insert tooling.

This operation, performed at the Menasco Manufacturing Co., Burbank, Calif., prominent manufacturer of aircraft landing gears, consists of rough and finish facing both sides of a star-shaped 11-inch diameter



forging on a 10-horsepower Warner & Swasey No. 2A turret lathe as shown in the accompanying photograph.

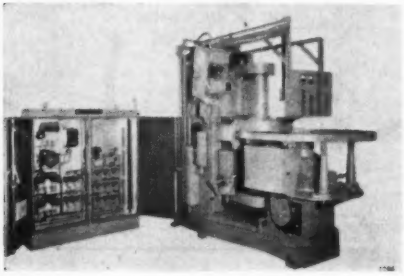
Heretofore, this job was performed with various grades of standard style GR-16 tools at 87 revolutions per minute, 0.0035″ feed and 0.030 to 0.095″ depth of cut. Even at this relatively low speed and feed, best tool life obtained was only two to four pieces per grind. Three cuts were also required for each side of the forging.

Standard style TFR-16A, grade K5H (hardest grade of Kennametal—93 Rockwell A) triangular insert tools are now used for the rough cut at 101 revolutions per minute—290 sfm and for the finishing cut at 134 rpm—385 sfm. This is one and one-half times greater speed than they were able to use. Feed used is now 0.0075″ per revolution—twice that previously utilized. Now only two cuts for each face of the workpiece are required. Depth of cut on roughing is 0.030″ to 0.125″ and 0.030″ on finishing. Under these stepped-up operating conditions, nine pieces are machined before any indexing is required. Since three cutting edges are available on each end of the triangular insert, both sides of 54 pieces are faced before regrinding of the tungsten carbide tool is necessary.

New Besly spring grinders improve grinding quality

Several of the new model Besly spring grinders (the No. 929 - 30/60 vertical spindle) have been installed at Delco Products Co., Dayton, Ohio. They are reported to have improved grinding quality and considerably reduced abrasive disc wear.

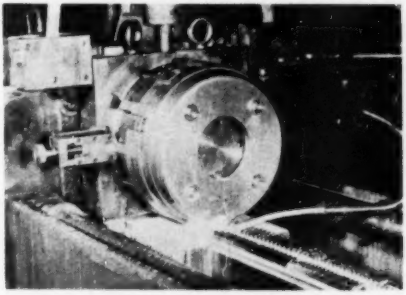
The springs processed at Delco are part of automotive direct action type shock absorbers. They vary in wire size from .080″ to .105″ and have an inside diameter of .586″. The ends are ground parallel with a 320° cleanup and must be square with the axis of the spring within ½ degree. Production output is approximately 1920 springs per hour.



The grinding is done dry with the entire cycle automatically controlled. In operation, springs are loaded into the slowly rotating feed wheel until all stations are filled, after which the cycle start button is depressed. The feed wheel goes into rapid rotation and the upper grinding head feeds to the work at a rapid traverse rate, progressing into a controlled feed and spark-out period where final size and squareness are imparted to the springs. At the completion of the spark-out period, the grinding head rises to its upper position and the feed wheel decelerates. At this time the springs are unloaded by gravity and the feed wheel reloaded in readiness for the next cycle. The grinder operates with the grinding cycle entirely automatically controlled. The control electrical mechanism is housed in a separate locker with push buttons convenient to the operator.

Single broaching operation replaces two-machine setup; coolant boosts production

Increased aircraft brake disk production schedules prompted one Canadian manufacturer to revamp a slow, two-machine setup and replace it with faster operation. Originally, 12 splines, equally spaced about a 13⅜″ dia., were rough-milled and finish-broached to hold a spline width tolerance of plus .000″ and minus .002″ and a total tolerance of .003″ between any two splines.



The logical solution was a fast, single horizontal broaching machine operation to rough and finish cut the splines in one pass while holding the close tolerances. Engineers of Colonial Tool Co. of Canada designed a fixture that utili-

zes a precision ground index plate and a full umbrella type clamp to hold three parts at a time. The large amount of metal removed, 3.92 cu. in. per pass, generated so much heat that the disks were being distorted and index errors were appearing. A new coolant-lubricant made by Shear-Speed Chemical Products, 7125 E. McNichols Road, Detroit 12, Mich., was used, and it was found that the broaches ran so much cooler that all distortion was eliminated and the chips fell away from the cutting edges freely without clogging or piling up.

Production rate is now up to twelve parts per hour, floor-to-floor time, with increased production. The parts produced with the Shear-Speed Soluble Oil are free from burrs and scores. The machine is a Colonial 15-72 horizontal broaching machine, operating at 144 strokes per hour.

Spindle tooling jumps production 50% - cuts grinding, down time

In doubling front wheel spindle production at a large midwestern automotive plant, new multiple tooling has reduced down time, grinding and has eliminated two dual-insert holders while increasing part production from 600 to 1200 spindles per machine in an eight hour shift.

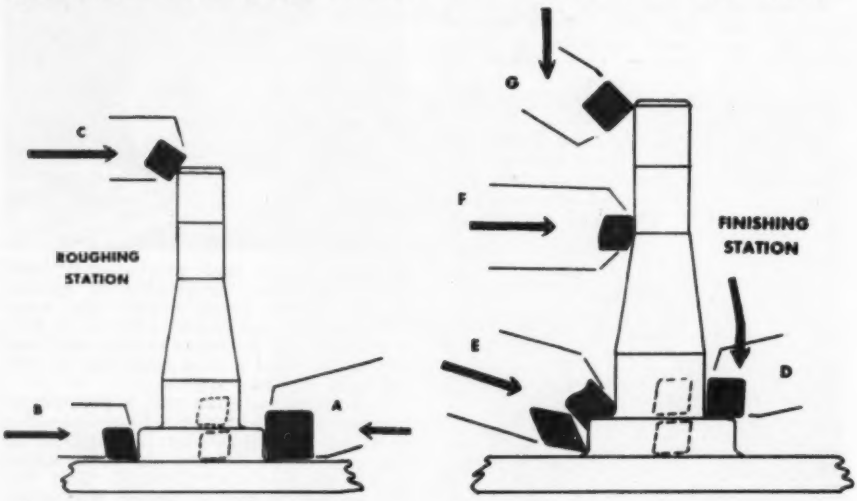
The front wheel spindles, S.A.E. 5132 with a Brinell hardness of 250-302, are turned on four-station 10″ vertical Contin-U-matics. The Bullard machines are hydraulically operated and are equipped for automatic retraction. The tail stock, manually advanced, has an anti-friction center.

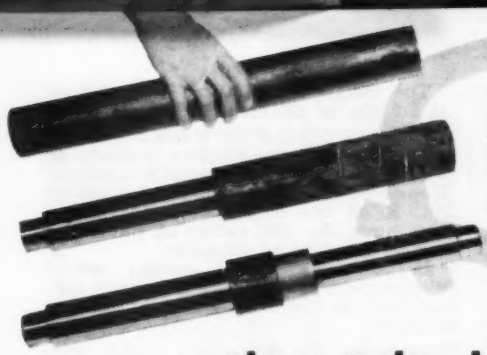
In roughing and finishing the spindles with previous tooling, several difficult machining operations were encountered which resulted in excessive down time and grinding. A large factor in converting to the new tooling with Wesson Band-Type Multicuts was the high tool breakage encountered with previous set ups.

In the roughing operation, two holders were required to face the spindle flange and turn the bearing diameter. Both tools were replaced with one single insert Multicut holder which performs both operations on the new set up.

Because the forged spindles frequently carried irregular and excessive amounts of stock due to die wear, it resulted in high carbide usage. Frequently, these worn inserts remained in the machine beyond the safe wear point, causing both insert and tool breakage.

Another cost factor was the limitation of only four cutting edges on the dual-insert holder, as opposed to eight cutting edges per insert on the new Multicut. The dual-insert holder was designed for 80° diamond inserts. This same tooling, eliminated on the finishing operation also, resulted in an initial savings of $1,490.52.





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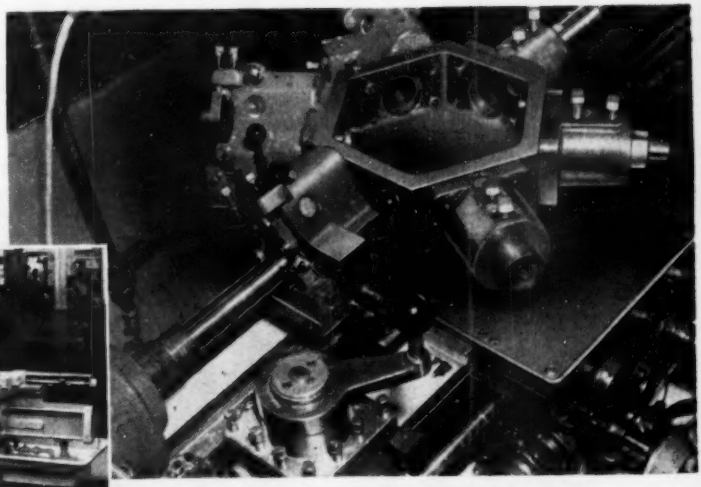

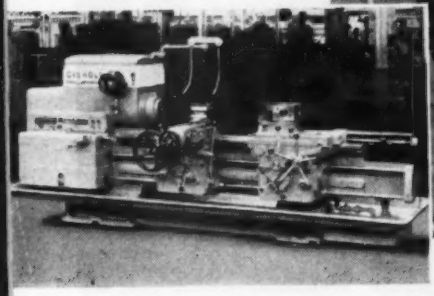

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Because excessive stock remained on the flange end of the oil seal bearing diameter, grinding costs became prohibitive including a high rate of grinding wheel consumption. This grinding was necessary to form a special radius.

In the roughing operation at Station No. 1, the new tooling consists of three Multicut holders. Tool No. A with a ¾" square carbide insert, faces the spindle flange and turns the large bearing diameter. The facing operation proved to be the toughest on this station since the carbide is subjected to severe interrupted cuts. However, one cutting edge produces over 90 pieces with a minimum amount of wear.

Opposing this tool in the roughing station is a finishing tool (No. B) which finish faces the flange and turns a ⅛" radius on the flange end of the bearing diameter. Simultaneously, tool No. C finishes a ⅛" x 45° chamfer on the stem end.

On the old style tooling, the dual-insert holder rough turned the bearing and oil seal diameter while an additional round insert tool rough faced the flange.

The roughing operation is performed at 510 sfm at 827 rpm, with a ⅛" depth of cut.

In eliminating the grinding problems on the new tooling, a specially designed Wessonmetal insert was applied to holder No. E on the finishing station which now turns the .050" radius on the flange end of the bearing diameter.

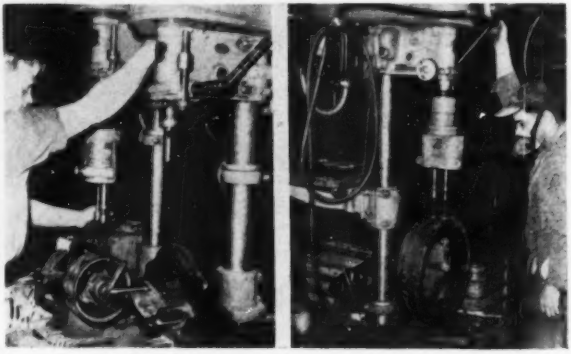
In the same holder, another special Wessonmetal insert turns and forms special radii on the stem end of the bearing diameter.

Replacing the dual-insert holder with 80° diamond inserts giving only four cutting edges, a ½" square insert holder with a 5° lead angle now finishes the oil seal bearing diameter.

All inserts on the roughing and finishing station are indexed after 250 pieces, averaging two complete insert changes per shift. The only exception is the roughing tool No. A on Station No. 1 which is subject to the severe interrupted cuts while facing the flange. The Wesson Co., 1220 Woodward Heights Blvd., Detroit (Ferndale 20) Mich.

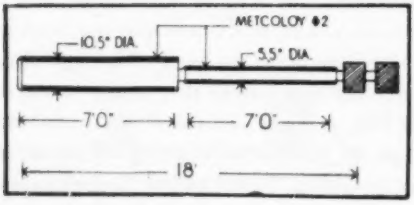
Drill presses perform double-duty operation in brake shoe plant

These Delta drill presses with multiple heads play an instrumental part in the production of regular and heavy-duty brake shoes for the automotive industry at Timken-Detroit Axle's brake shoe plant in Ashtabula, Ohio.



The two drill presses side-by-side, at the left, drill and ream, or drill and counterbore, some 400 Duo Grip brake shoes during an eight hour shift. In a very similar operation, one drill press, at the right, is used for precision, counterboring and drilling of 14 holes in heavy-duty brake shoes. This drill press works about 550 shoes during an eight-hour shift.

In both drilling procedures, the brake shoes are ready for riveting immediately after leaving the drill presses.



Metallizing saved $11,400 on pull-back ram

A manufacturer of aluminum extrusions found that the pull-back rams on his aluminum extrusions press had been badly scored and required repacking every other week. It was decided to rebuild the rams with metallized stainless steel. After four years of use the

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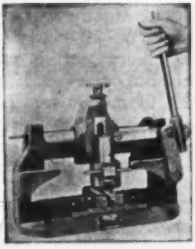

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metallized rams had not been repacked once. This metallizing user estimates his savings on replacement parts, packing material and labor to be $11,400, in four years. Metallizing Engineering Co., Inc., 38-14 30th St., Long Island City 1, N.Y.

Central coolant system boosts efficiency of grinders at Warner & Swasey New Philadelphia plant

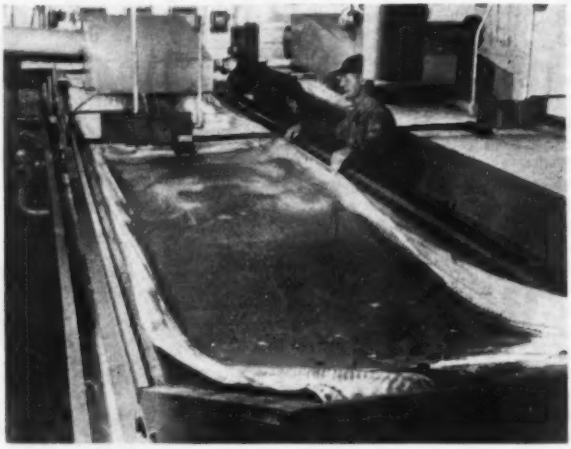
A central coolant system which supplies continuously filtered coolant to all the plant's grinding machines substantially boosts efficiency and quality of grinding work at the new Warner & Swasey parts plant at New Philadelphia, O.

One of the few such systems to be incorporated in new plant design in the country, the coolant operation centers in a below-floor filtering and reservoir installation occupying an area 17′ x 34′ x 10′ high.

All of the plant's grinding machines are served by pressure piping from two 2100-gallon filtering tanks in this room. Spent coolant containing work chips and abrasive particles is discharged from the machines into a covered floor channel through which it flows back to the filtering tanks by gravity.

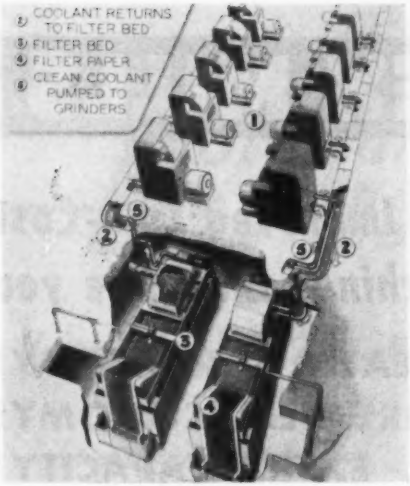
Spent coolant drops into either or both of the filtering tanks, which incorporate continuous roll feeds of 48" wide filtering paper to strain the contaminating particles from the fluid. Clear coolant, withdrawn from the bottom of the tanks, is pumped back to the machines at a maximum relief valve setting of 25 psi.

The system is so interlocked that one or all of the three 450 gpm vaned impeller-type pumps may be operated in conjunction with one or both of the filtering tanks in accordance with the number of



Spent coolant returning from grinders discharges into filtering tanks, where continuous, slow travel of 48" wide filtering paper strains out and removes contaminating particles. Fresh coolant is withdrawn from bottom of tank for delivery through pressure piping back to machines. The two-tank system provides capacity for coolant service to grinding machines, resulting in higher operating efficiency and better quality finishes. The level control apparatus, which paces operation of the system, bridges the tanks at the center.

Pressure piping for fresh coolant delivery and open return trough for spent coolant occupy the same covered channel in Warner & Swasey system. All of the plant's grinders operate from the common channel.



A schematic drawing of the modern central cooling system in use at Warner & Swasey's New Philadelphia (O.) plant.

machines operating. Twenty-eight grinders, varying in size from 4" x 18" external to 36" x 60" rotary surface units, are presently working in the system, which has an ultimate capacity of 40 machines.

Pumping rates and paper feed are regulated by level control switches in the tanks.

Used filter paper feeds down into steel bins at rear of the filter room, where a fenced opening to the plant above permits periodical removal for disposal by the overhead bridge hoist serving the bay.

With centralized control, coolant waste is virtually eliminated; there is no throw-away involved as otherwise might be the case due to mixtures growing rancid in temporarily idle machines.

Finally, the system makes it possible to maintain a uniform coolant temperature. The entire installation is expected to pay for itself in two years.

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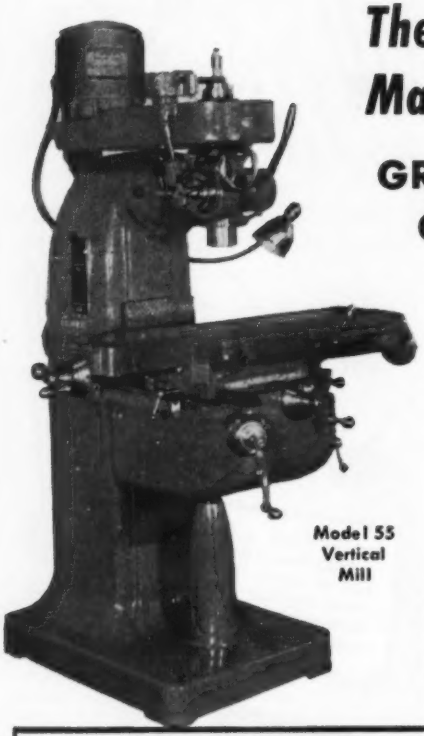

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Foremanship Forum

Keep Quality Up and Costs Down

By **Edmund Mottershead,** President
Mottershead Associates
Chicago, Ill.

RECENTLY, the general manager of a mid-west plant called a meeting of all supervisors to tell them something about company plans. "We are in a tight competitive situation," he told his men. "It means that we are going to have to tighten our belts and fight for every bit of business we can get.

"This means that we must depend on you fellows to do a close cost control job in your own departments. You are the part of management located right at the point where the actual work is being done. I'm not going to tell each one of you how to trim costs in your department. I've told you how important it is, and I'm going to be very much interested in watching how each of you tackles the problem in your own department."

After hearing the general manager's remarks, Bill Thompson, small parts assembly foreman, decided that if he was going to get cost results in his department he would have to get them through his men. He planned his work so that each day he could spend half an hour or so having very personal chats with individual workers. He would tell them what the general manager had told the foremen. He would give them all the background he could as to the company's competitive position. He told them what he could about company plans for the future. He reminded the workers that the future of the jobs of every one in the concern depended upon whether the company's product could be made to sell in competition on the market.

Then Bill went on to point out all the ways in which the individual worker stood to gain by holding costs down. He talked over the worker's job in some detail, discussed the condition of his tools and equipment, the materials he was using, any difficulties he was encountering, and got the worker to tell him what he thought he could do to keep costs down on his job. He made it clear that he was not trying to eliminate jobs by improving efficiency, but trying to protect the jobs of all by keeping costs in line. These personal

interviews revealed a great many things. Bill got some excellent suggestions. Not only did the men respond favorably, but many were already cost conscious. Over a period of about three weeks he carried on these interviews and covered every man in the department He was gratified to find that his men could be interested in costs when the subject was put up to them in such a direct man to man way.

Quality and costs are interrelated. In many cases, when a definite attempt is made to raise quality, costs go up with it. The two answers to that threat are greater individual efficiency of production and less waste. The foreman or assistant foreman who keeps his job under present conditions, or who advances higher up the managerial ladder, will be the man whose workers have the best record for economy and efficiency and above all for quality production.

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The effectiveness of the average foreman or supervisor is usually measured by management by three very important standards: His contribution to improving the quality of the product, his contribution to reducing the cost of the product, and the ability he exhibits in maintaining manufacturing schedules in his department. Any activity on the part of the foreman which does not result in the attainment, either directly or indirectly, of these ends, may be counted time and effort misdirected and lost.

Control of quality involves the establishment and maintenance of proper standards of material and workmanship as they appear in the finished product. Obviously, manufacturing operations can succeed only so long as they produce a salable article, one which is consistently acceptable to the

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public. While many factors go to make up the salability of the product, most of them may be lumped together and called the "customers' value" or the value of the product from the customers' point of view.

These values from the customer's standpoint may be those of direct usefulness, of durability and length of use, of availability at a given time or place, of prestige or style or glamor or other "personal" values over and above the functional values supposedly inherent in the product.

Ideally, we might say, every man in the shop should be his own inspector, should have sufficient pride in his craftsmanship to maintain a high quality of production. If you can sell this idea to the whole plant you will have accomplished the impossible. But it is not enough to tell them why they need to give more attention to maintain quality; you need to show them also some of the spots where they can direct their attention specifically to get results. A few of the major factors which basically affect quality of the items you

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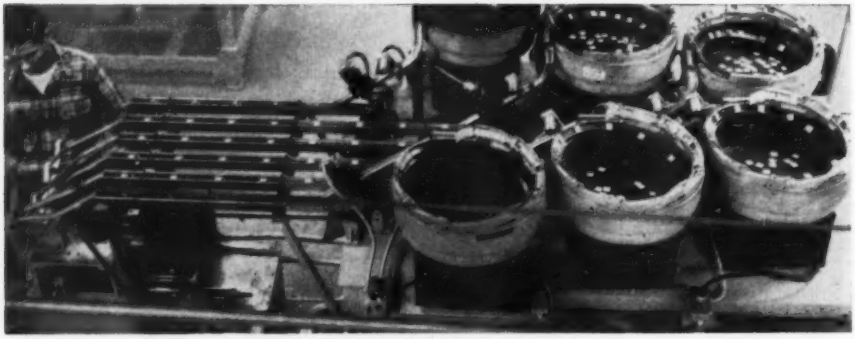

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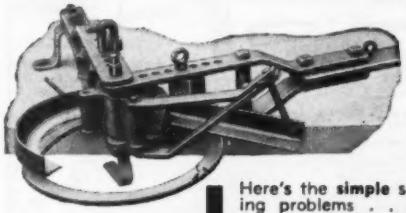

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805D-18	10"	18"	6"	18	2.42	2.67
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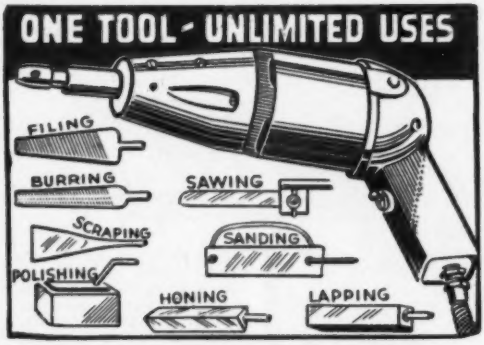

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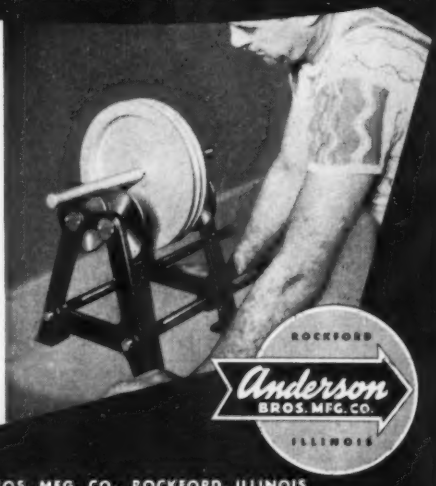

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manufacture include: design, competitive price picture, specifications to the shop, class of workers available, machinery and equipment available, top management pressure, material available, and inspection procedures.

Competitive price and competitive cost limitations put a direct limit upon quality, but workers may be expected to produce maximum quality within assigned limits.

Automobile engines such as the old Stutz and Franklin and Duesenberg used certain more valuable and probably more durable metals in key parts than are used today; but other features of engine operation have become more efficient, and customers are more interested in automatic transmissions than in the nature of the materials used. The building trades have seen similar eliminations of highly skilled cabinet work, expensive woods and construction methods, as demands for housing within certain price ranges has enforced these changes in design and specifications.

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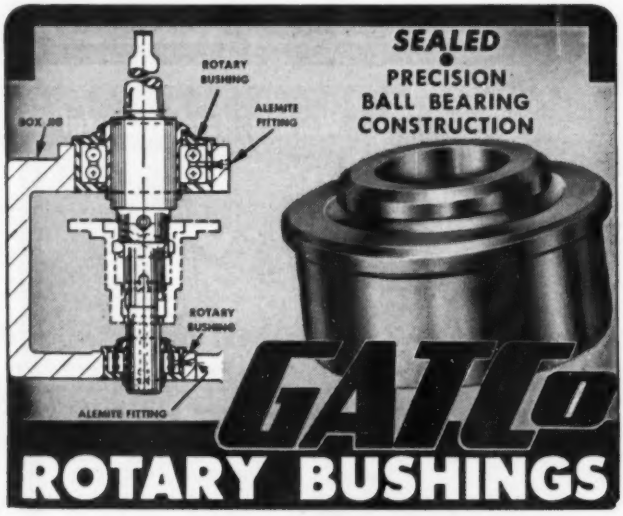
of equipment are forced to meet competitive price ranges and satisfy growing customer demands for specific types of satisfactions of their various needs within those price ranges.

One of the greatest factors in quality control and cost reduction that is sometimes overlooked is the problem of the pressure put on foremen and workers by top management. Top management—or the sales department—often screams for more production, for more quality, for more speed, especially in these days when competition for business is increasing and the pressure is on. New workers are especially prone to work too fast before they have completely learned how to do a particular job. It is sometimes hard to slow down and do the job properly, but if it is not done right, the product is no good to anyone, and this pressure frequently develops into a bad case of haste makes waste.



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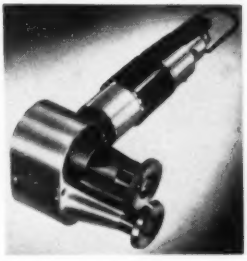

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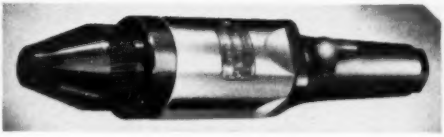

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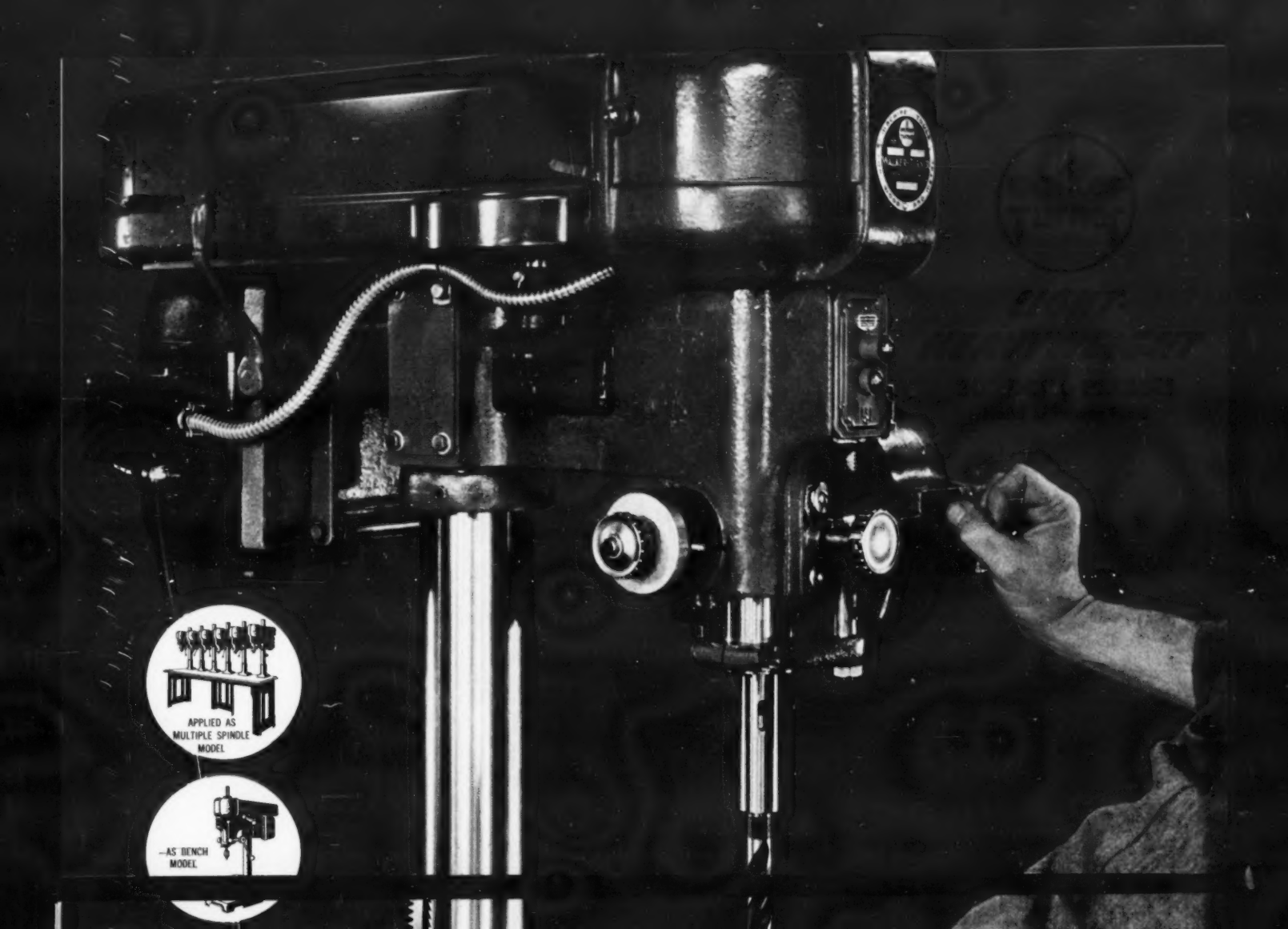
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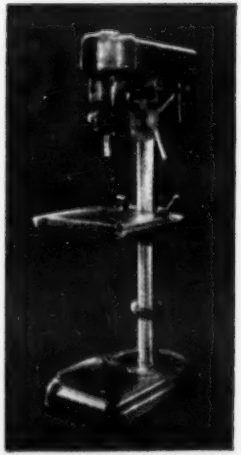

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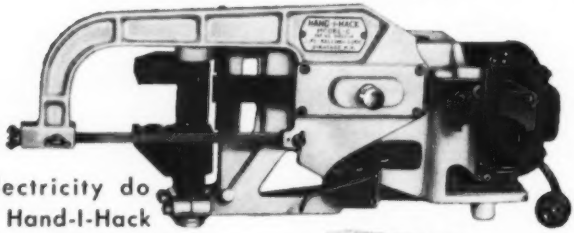

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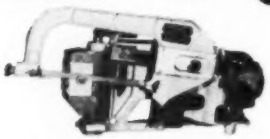
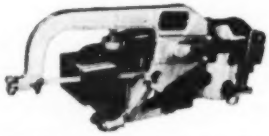


Cutting small diameter brass tubing, using wood block false jaws.



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To a large extent it is the function of the foremen and supervisors to absorb this pressure and keep at least a part of it from worrying the workers and creating unrest. This makes a challenge to real leadership and thus gives the foreman a real opportunity to build up in his workers a strong feeling of loyalty.

In the last analysis, there are two ways of looking at the problem of quality and costs: looking for remedial action which may be taken for existing situations; and planning in advance for an entirely new operation. Foremen are in close contact with all phases of shop operations. Naturally, they are chiefly interested in materials and men; but the other factors of management pressure and competitive costs are part of their job too; and it is essential that they pay adequate attention to these problems as well.

The End.

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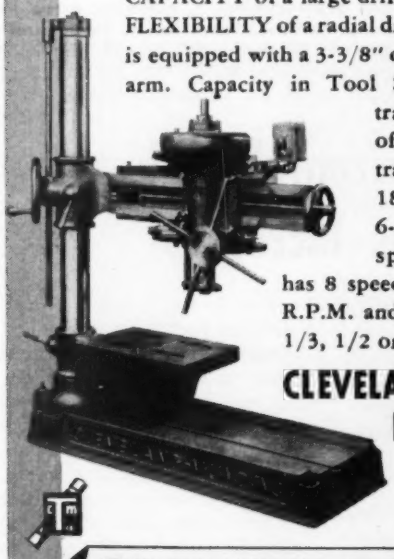

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A special report by the editors of MACHINE and TOOL BLUE BOOK

Report number 41

Presses . . . part 3

This is the forty-first in a monthly series of special reports discussing various types of machine tools. Included in this month's special report on presses are:

1. Popularity of horizontal high production presses increases.
2. Descriptions of late model presses.
3. Specifications of American-built machines.

Previously published reports discussed: 1. Thread Rolling; 2. Power Press Brakes; 3, 4, 5. Milling Machines; 6. Honing, Lapping, and Superfinishing; 7. Automatic Screw Machines; 8. MAPI Replacement Formula; 9, 10. Chucking Machines, Turret Lathes, Hand Screw Machines; 11. Broaching Machines; 12. Shapers, Slotters, Keyseaters; 13, 14, 15. Lathes; 16. Planers; 17. Gear Making Machines; 18, 19. Boring Machines; 20, 21, 22, 23, 24, 25, 26. Drilling Machines; 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38. Grinding Machines; 39, 40. Presses.

Popularity of Horizontal High Production Presses Increases

KNOWN VARIOUSLY as four-slide machines, Multi-Slides*, etc., the popularity of the horizontal high production presses has increased in direct proportion to the use of metal stampings—both as end products and as components of complicated assemblies.

The unit made by U.S. Tool Co., Inc., Ampere (East Orange) N.J., the Multi-Slide, is one particular make of machine that employs one or more rams for conventional press-die operations, plus a four-slide forming arrangement for supplementary operations. These additional operations usually are of such nature that they would not ordinarily be done in the first die setup on a conventional press.

Ordinarily, stampings are produced in either conventional punch presses, dieing machines, four-slide machines or variations of these. Each of these types has its own advantages and limitations. In this machine cams mounted upon a continuous shaft system around the four sides of the machine bed actuate the various rams and slides. Work material is normally fed into the machine in a vertical position, as compared to conventional presses where the material is usually fed horizontaly. Because of the normal on-edge position

**Reg. U.S. Tool Co., Inc., Ampere, N.J.,*

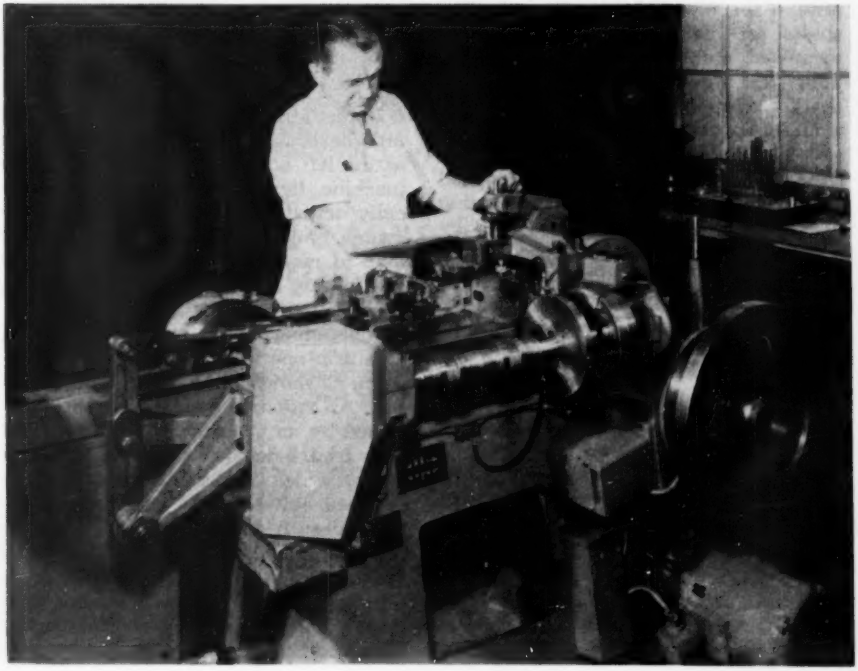
of the material, most of the tooling members operate in the horizontal plane. An important exception to this is the final-form stripper which operates vertically.

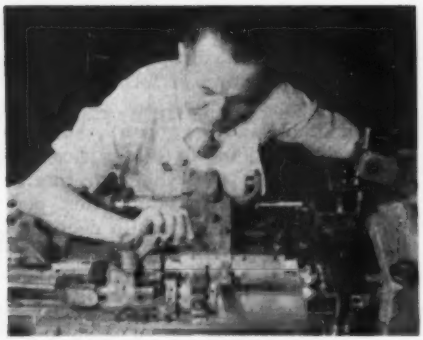
The machine is so designed that, depending on machine size, from one to four rams can be mounted and used simultaneously. On each ram is mounted a die assembly comparable to that used in a conventional punch press. Available, in addition to the four standard forming slides, is a variety of other slides such as a rear auxiliary slide that is employed to provide counter-pressure to that exerted by the rams.

Rams on late models in the larger sizes can be actuated from either front or rear of the machine. This is an advantage when burrs must be limited to a particular side of the finished piece, relative to direction of forming.

Where part fabrication requires a combination of operations, such as swaging and trimming located close together, the fact that the ram can be used from either direction often permits a better die design with decreased tool maintenance. In certain instances, two rams can be used in directly opposed position. This means that both the punch and the die move in and out from the stock line, permitting free movement of material that has undergone a drawing or pre-forming operation.

1. Setup man making adjustments to the tooling on a No. 28 Multi-Slide horizontal high production press. This type machine employs one or more rams for conventional press-die operations, plus a four-slide forming arrangement for supplementary operations.





2. At the left is a setup man making adjustments to the tooling on a No. 28 Multi-Slide, and at the right is a No. 33. An unlimited variety of intricate parts can be produced automatically within close tolerances and at high production rates on the four-slide machine. Stampings previously requiring operations on as many as ten separate presses, each with its own operator, are now completely finished on one machine.

The Multi-Slide has a shaft system around the four sides of the bed. The shafts are joined at the corners by means of miter gears made of special alloy steel. Power is applied to the camshaft system through gears. The horizontally operated die head, forming slides, and feed mechanism are actuated from the shafts by suitably designed cams and eccentrics. Smooth starting of the machine is accomplished by means of a clutch, no gears being disengaged. The flow of power is smooth, as the operations are so timed that they are well distributed and do not occur at a given instant as in the case of conventional presses.

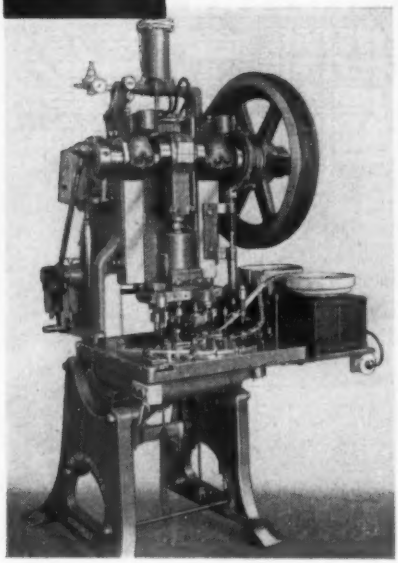
For heavy duty swaging, embossing, coining, or countersinking of previously pierced holes, a horizontal lever or toggle press, capable of exerting up to 100 tons, can be mounted on the machine bed in place of a ram.

Unlimited Variety of Parts

An unlimited variety of intricate parts can be produced automatically within close tolerances and at high production rates on the four-slide machine. Stampings previously requiring operations on as many as ten separate presses, each with its own operator, are now completely finished on one machine.

In operation, the stock coil is mounted on a horizontal reel, which is positioned at the left hand or entrance end of the machine, figure 3. The reel is periodically actuated by means of a mercury switch, and maintains constantly a loose loop of material between the reel and the feeding mechanism of the machine. Stock is fed from the loose loop through straightening rolls by means of an eccentric-operated slide feed mechanism, as shown in the schematic drawing. An automatic accurate feed is obtained by an eccentric-actuated motion of a feed block, containing a gripping blade, which is confined to an exact advance between two adjustable positive stops. A cam-actuated stock check unit prevents movement of the stock during the working cycle, as well as during the return stroke of the feed block. The feed block reciprocates on hardened and ground slide rods between

BUILT FOR AUTOMATION



V & O presses are built to machine tool standards. They provide the accuracies essential to profitable use of extensive tooling. And this high precision is maintained on job after job. The famous V & O long slide assures true alignment throughout the operating stroke.

If you want to do more and get more out of a press, specify V & O. We have been automating our presses for 65 years. Our new booklet will give you the complete story.

By taking advantage of long slide precision complicated dies can be fed from two or more synchronized hoppers.

WHY THE V&O LONG SLIDE PROVIDES BETTER ALIGNMENT

With the same running clearance, the longer the slide the less the possibility for angular misalignment. And we keep our running clearances very close indeed.

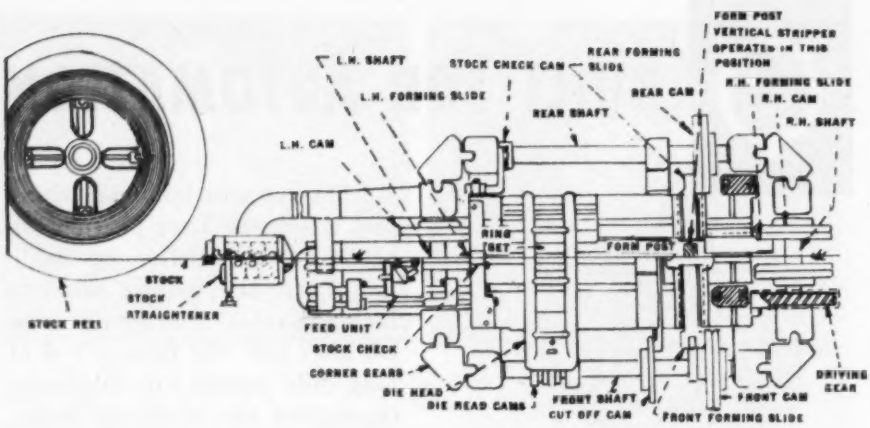
THE V&O PRESS COMPANY

DIVISION OF EMHART MFG. CO.

65th Anniversary

HUDSON, NEW YORK

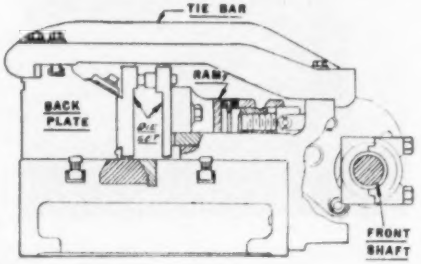
BUILDERS OF PRECISION POWER PRESSES AND FEEDS SINCE 1889



3. Schematic drawing of No. 33 Multi-Slide, looking down at top of machine.

adjustable positive stops and thus is confined to an exact advance, ensuring controlled accuracy of feed or pitch length to plus or minus .001". Between the feed mechanism and the ram is a cam-actuated stock check, which prevents any motion of the material after it has advanced to the proper pitch length, as well as during the return stroke of the feed block.

In the ram, the die members are fastened to a die shoe and the punch members are fastened to a punch holder. The die shoe and the punch holder comprise a die set of different design from those used with conventional punch presses. The die shoe is bolted to a vertical plate or bolster at the rear of the machine bed, while the punch holder is secured to the cam-actuated ram slide, which normally operates from the front of the machine, figure 4. From one to three cam-actuated horizontal die heads can be located on the bed between the feeding mechanism and the slide forming unit. The number of die heads used depends on the part being produced. Die members



4. Schematic cross-section drawing, looking from the left side of the press, showing method of ram operation and mounting of the die set.

are generally stationary, being bolted to a vertical bolster or plate at the rear of the machine bed, while punch members are secured to cam-actuated ram slides at the front of the bed.

After the die operations are performed, the blank is separated from the strip either in the die or by separate cam-actuated cutoff slide, mounted between the final ram position and the forming slides. When separated from

this is *Norgren*

MICRO-FOG LUBRICATION

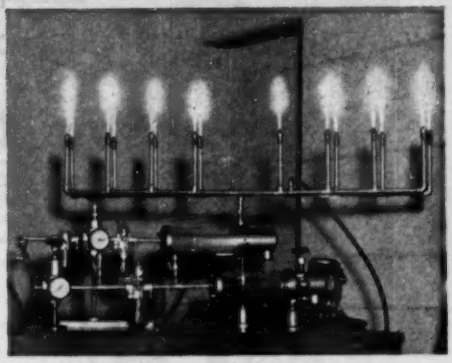
Special test chamber in Norgren research laboratory shows the fine, uniform Micro-Fog.

and this is what it can do for you...

Micro-Fog

▲ assures complete lubrication after **traveling through more than 130 ft. of hose**

assures equal distribution of lubricant **through as many as 40 outlets** ▶



Many different models of Micro-Fog Lubricators are available for your lubrication needs on air tools, air cylinders, gear boxes, high-speed spindles, and bearings up to a total of 500 bearing inches.

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- ***cut lubrication and maintenance costs.***
- ***improve equipment performance.***

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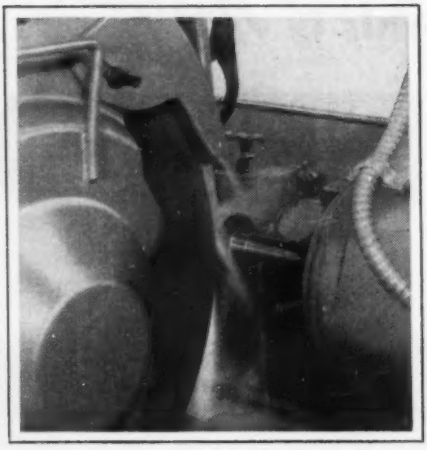

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NOW!

Cincinnati Grinding Wheels offer

Positive Duplication

PD

THE DEVELOPMENT of the new CINCINNATI (PD) Manufacturing Process is one of the most important improvements in grinding wheels in years—a development that will save you money and increase your production.

It means a brighter working picture for you because now, through the CINCINNATI (PD) Manufacturing Process you can be *positive* that *every* CINCINNATI (PD) WHEEL you order for a job will be produced exactly to the CINCINNATI grading specified.

Just as a negative guarantees exact duplication of a photograph, the CINCINNATI (PD) *Manufacturing Process assures a Positive*

Duplication of the original wheel every time you reorder.

The problem of duplication has been a major concern of Cincinnati Milling throughout its 30 years of practical experience in using grinding wheels, and in supplying industry with precision grinding machines equipped with grinding wheels and ready for production operation. Cincinnati Milling found that once the right grinding wheel had been specified for a particular job, sometimes it was difficult to secure additional wheels of identical grading that would duplicate the performance of the original wheel.

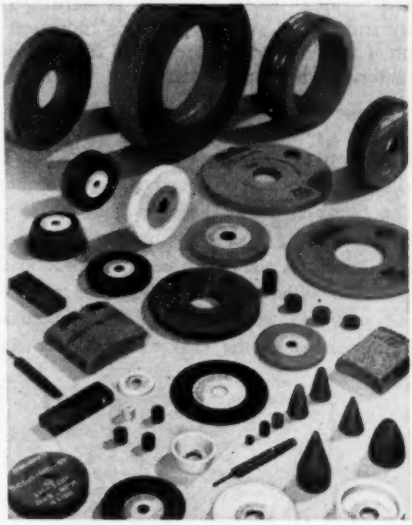
The need for Positive Duplication in the manufacture of grinding wheels is of utmost importance not only to Cincinnati Milling, but to every user of grinding wheels.

Positive Duplication (PD) is the result of extensive manufacturing research which revealed that *several steps* in the production of grinding wheels generally considered as unimportant, were quite to the contrary, *extremely important.* As one step toward (PD) WHEELS, Cincinnati Milling constructed the world's most modern grinding wheel plant. Some of the equipment installed has never before been used by the industry in the manufacture of grinding wheels.

Then, to make (PD) WHEELS an actuality, Cincinnati Milling developed new standards of manufacture with 36 quality control steps. From the weighing of the grain and bonding material, through molding, drying, firing, finishing, to final inspection, every operation is carried out with the same exactness as in building a precision machine tool.

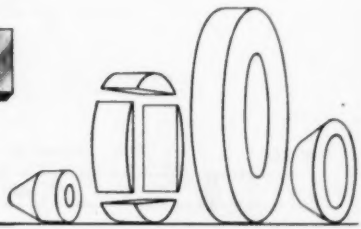
You're assured a Positive Duplication of the original wheel *every* time you reorder. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike. For you, this means *no more production interruptions* which cut output and increase your costs.

Let us prove to you how CINCINNATI (PD) WHEELS will make money for you. Just contact us and we'll send one of our representatives—men who know grinding and grinding machines as well as grinding wheels. Write, wire or 'phone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.



CINCINNATI (PD) PRECISION AND SNAGGING WHEELS are available in vitrified and resinoid bonds in a complete variety of popular sizes and shapes.

CINCINNATI
Grinding Wheels
THE CINCINNATI MILLING MACHINE CO.
Cincinnati 9, Ohio



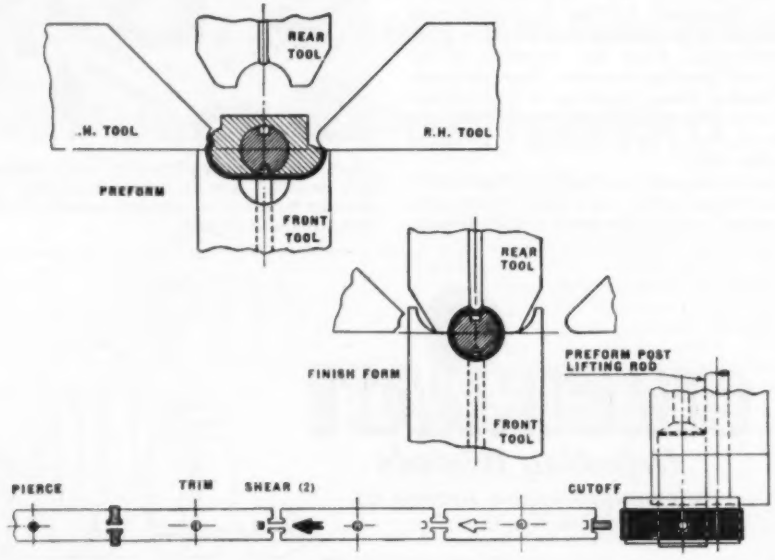
the strip at this point, the blank is picked up by the forming tools immediately after cutoff.

Sometimes it is not advisable to cut the part from the strip in a die head. In such cases this can be done just before final forming by mounting a cam-actuated cutoff slide between the die heads and the forming slides.

The standard forming unit consists of left hand and right hand, front and rear slides. Each of these is actuated by individual split-type cams mounted on cam carriers which, in turn, are fastened to the horizontal machine shafts. This facilitates setup and adjustment, since the shaft system does not have to be disturbed. Multiple action of the forming slides can be obtained by providing several lobes on the slide-actuating cams.

Such machines are usually arranged with an electrically operated brake which is controlled by two micro-switches. When the end of the strip of material enters the forming position, it contacts one micro-switch, which is located under the stripper head of the machine. At the same instant, a cam on the rear shaft actuates the second

5. Operations sequence for typewriter ribbon spool core. Piercing, notching, trimming, shearing (lancing) and embossing operations are performed in the ram of the machine. The blank is then separated from the strip by means of a tool on the cutoff slide and is immediately picked up by the forming tools. Tools mounted on the front, right hand and left hand slides are used to pre-form the part around a pre-form post. These slides are then withdrawn, and the outer pre-form post is raised out of the way by a lifting rod operated from the stripper mechanism of the machine. The front tool advances again and with the rear tool, finish forms the part around the finish form post.



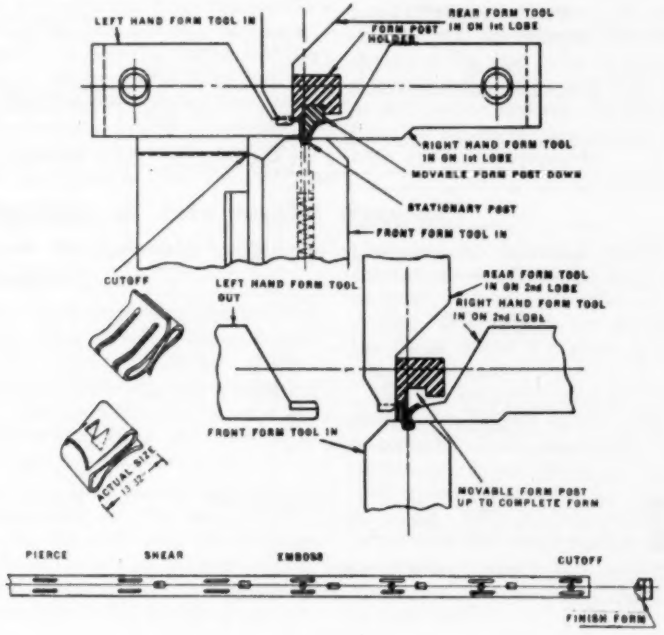
micro-switch, which is synchronized with the one under the stripper head. This stops the machine instantly, preventing damage to tools and machine.

It would be safe to say that practically any material can be formed on such units. Annealed or soft grades of material are, of course, easier to form, and they produce less wear on the tools and dies. When forming is not severe and sections of the part are relatively thin, tempered materials can be formed. In such materials as phosphor-bronze, stainless, and other high temper metals, spring back is sometimes encountered after the part is formed. Changing the shape of the form tools during their development or while they are being set up on the machine sometimes compensates for this.

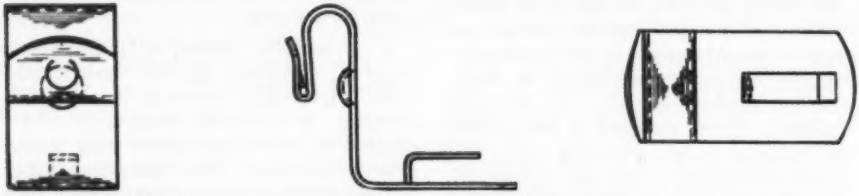
It is usually better to plate after forming. Coatings thicker than about 0.0005" generally increase the cost of forming. A cadmium coating is often applied to beryllium-copper strip stock as a die lubricant. The cadmium can be burned off later, during heat treatment.

Because of the various movements

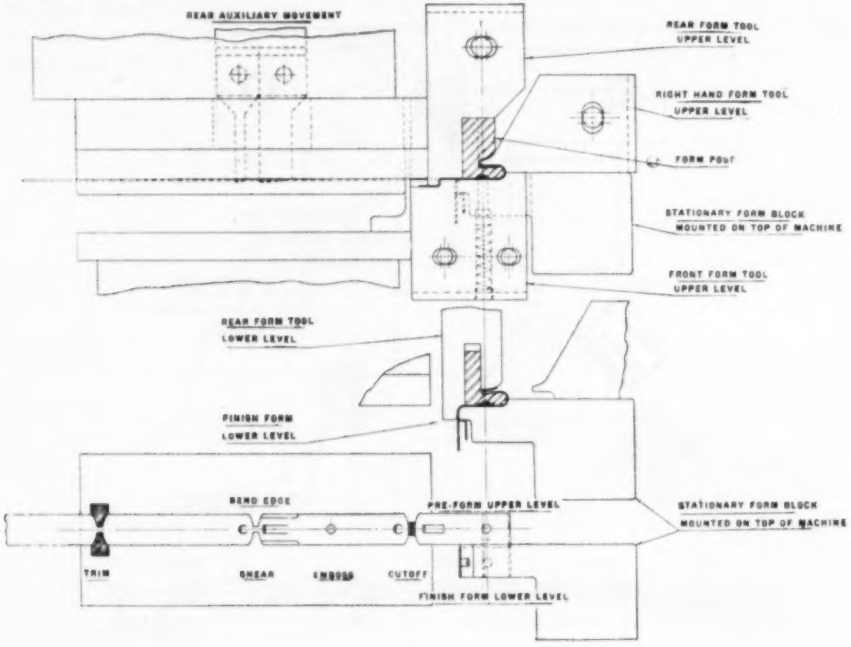
6. Die and forming operations for producing an electrical part from .018 x 5/16" copper; piercing, shearing, and embossing operations are performed in the ram. The blank is separated from the strip by means of a cutoff slide and is then immediately picked up by the forming tools. The pre-form is accomplished by using all four forming slides. The finish form is obtained by using the front, rear, and right hand slides with the movable form post in the "up" position. Both the rear and right hand form tools are actuated by two-lobe cams.



provided, parts of quite intricate shape can be completely produced in a single machine setup. In many instances, parts that would normally require secondary operations and handlings, if made on conventional presses, can be produced complete in the one machine; even minor assembly operations have been successfully performed on this type of machine in conjunction with more con-



7. These are three views of an electrical part 1¼" high produced on a No. 33. The ¾" wide copper came in coils and was fed into the machine from a horizontal stock reel. The machine is equipped with an eccentric operated slide feed which pulls the material from the free loop provided by the stock reel, through the flat stock straightener, and then pushes it into the machine. The feed is adjusted to advance the material at each revolution an amount equal to the flat length of the blank plus cut off material. The sequence of operations in the machine itself, may be followed in the sketch below: First position (in die)—trim and shear using rear auxiliary movement; second position (in die)—bend edge, shear, (using Bear auxiliary movement) emboss and cut off; third position (in forming tools)—preform in upper level; fourth position (in forming tools)—finish form in lower level. The stripper mechanism is used to transfer part from upper to lower forming levels.



ventional press-die and form tool operations.

Materials in widths up to 3" and in thicknesses up to 3/32" can be handled on larger size machines. Maximum length of feed per stroke varies from 3" to 12½". The stroke of the ram varies from ⅜" to ¾" and the throw of the forming cams from ⅞" to 2" on the Multi-Slides.

Tool Design and Planning

The designing of dies for the four slides is similar to the laying out of progressive dies for regular punch presses. However, there are some differences. It is standard practice to employ sectional construction for the dies, the sections being form ground. Sectional construction permits minimum clearance and draft (relief) in die openings. Since the ram movement is horizontal, slugs are pushed through the die in upright position and the reduced clearance prevents the slugs from pulling back with the punch. Minimum draft results in greatly extended die life, because more sharpenings can be made before the die opening loses size.

As simultaneous use of a number of rams is possible, the work load may be better distributed. The designer is able to lay out dies with working stations spaced in such a manner that frail punches are not crowded into a small area.

When work can be spread between four rams instead of one, it is often easier to build and set up four smaller dies than one long and heavy progressive die. The fact that there are four separate dies makes it simple to incorporate modifications in any stage, and it is also easier to change one simple die than a complex single progressive die.

Die inserts, punches, forming tools, etc., are most often made from steels with a Rockwell C of 60 to 62, generally high-carbon, high chromium. Retaining blocks for die inserts and punches are usually of oil-hardened tool steel which is not heat-treated.

For high production forming of materials such as stainless steels, cemented carbide is often employed for the die inserts, punches and forming tools. Form posts and forming tools are made most often from the same 60 to 62 steels as punches, die inserts, etc., but if the design of the part to be formed requires a thin cross-section post that is subject to continuous flexing, the post is made from an oil-hardening tool steel having high fatigue resistance.

The End

Descriptions of late model presses

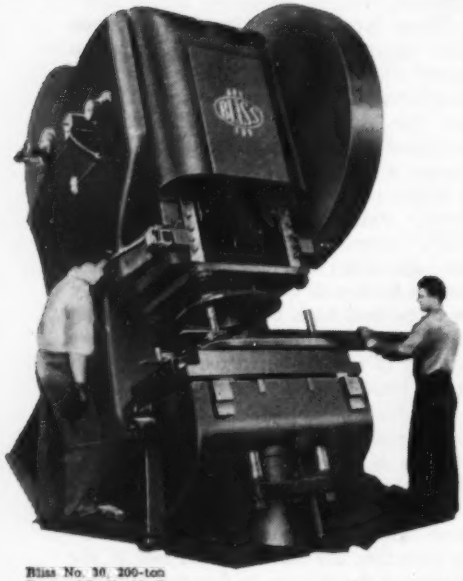
Cleveland 8K knuckle joint press

Knuckle joint presses manufactured by the Cleveland Punch & Shear Works Co., E. 40th and St. Clair Ave., Cleveland, Ohio, are especially recommended for use in the manufacture of products which require a short but extremely powerful squeeze on the metal.

Two of the outstanding features of Cleveland design are the long bearing surfaces for the slide and the massing of material at points of greatest stress. These two features contribute greatly to the accuracy with which parts are produced by insuring ample bearing surface even when the slide is at the extreme end of its stroke and by reducing the spring or deflection on the frame when the press is taking its maximum load.

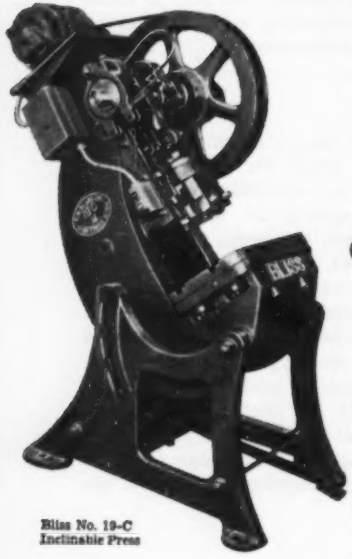
The 8K knuckle joint press is single geared, equipped with single station electrically controlled air operated Cleveland drum type friction clutch with spring loaded brake. The press is arranged with a pneumatic cushion in the bed, and has a shuttle feed which is used for feeding flat blanks into the press for the cupping operation on 37 mm shells.

9 reasons why Bliss Inclinable



Bliss No. 30, 200-ton
Enclosed Inclinable Press

Rails and ties for Lionel electric toy trains are assembled at the rate of 1250 per hour in this Bliss No. 21 Inclinable Press with 48", 8-Station Bliss dial feed and a staking die.

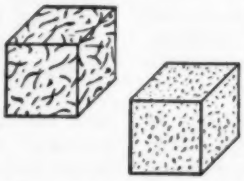


Bliss No. 19-C
Inclinable Press

You have only to look "inside" a Bliss Inclinable Press to see where it gets its *ruggedness* and almost indestructible *precision*. Why it delivers consistent, uninterrupted performance over the entire range of press operations from blanking to drawing. Why it's the most-specified inclinable press among stamping shops and fabricators, with over 50,000 in use throughout industry.

Let's take a Bliss Inclinable apart pictorially and examine the physical reasons for its ruggedness and precision...whether it be a 10-ton or 200-ton press out of Bliss' range of standard sizes.

❶ FRAME



Strong and durable press frames of high tensile Meehanite castings are produced under rigidly controlled foundry practices. These three-dimensional drawings show the distribution of graphite in ordinary cast-iron (left) as compared with controlled graphite structure of Meehanite casting (right) used in Bliss presses.

❷ CLUTCH

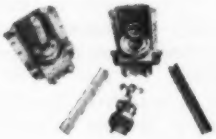
Often described as the finest positive clutch available on any press, Bliss patented Rolling Key Clutch is standard feature of Bliss Inclinables up to 5½" shaft. Note location of clutch keys near shaft center. This means slower-moving points of engagement, faster operating speeds, less shock during intermittent operation and longer life to all moving parts. Bliss Inclinables can also be equipped with air-operated friction clutch, which is standard for presses of 6" shaft diameter or larger.

Presses outsell all other makes

③ CONNECTIONS

Another feature is solid, plug-clamp connection strap, which gives full 360° bearing against slide adjusting screw. This arrangement also permits using V-thread on screw, making replacement easy.

④ SLIDE ASSEMBLY



Slides are accurately gibbed to insure precise registry of die and punch. Ball seat is renewable, as are split bronze ball-cap bushings and laminated shim against which ball-cap is brought down by four bolts to give correct clearance for proper lubrication and fit. All parts are machined to close tolerances for interchangeability. For a fraction of the cost of a new slide, you can recondition the ball seat bearing.

⑤ BEARINGS, WAYS AND GIBS

Main shaft bearings and connection bearings are bronze bushed. Roller Bearings are standard for drive shaft bearings on large geared presses. All wearing surfaces are especially finished to insure long life.

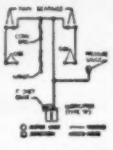
⑥ CUSHIONS

Every Bliss Inclinable Press is designed to accommodate Bliss Marquette die cushions which extend the press application to drawing operations on medium gauge metal.

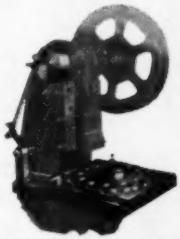
Many Bliss cushions are supplied for presses that have been in use for years. Placing the responsibility for efficient press and cushion operation with Bliss assures you of the utmost in satisfactory performance.

⑦ LUBRICATION

Bliss Inclinables have floor-line lubrication systems with oil or grease fittings at main points of moving contact. All standard Bliss Inclinable frames are machined to take Bijur one-shot pressure system.



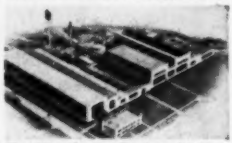
⑧ FEEDS



Bliss Inclinable Presses are designed to take any type of Bliss automatic or semi-automatic feed. Addition of a few extra parts to the regular constant tension brake will convert it to an automatic releasing brake for continuous operation with roll, dial or magazine feeds. Every Bliss feed is engineered to specific requirements yet a large variety of standard designs is available. A Bliss feed on a Bliss press means the finest equipment that money can buy, plus a *single responsibility* for efficient performance of entire unit.

⑨ SERVICE

All replacement parts and service orders carry *top priority* at Bliss to reduce your press "down time." Supplying service parts for presses more than 50 years old is routine at Bliss. Accurate-fitting parts are supplied from stock by virtue of precision manufacturing methods which guarantee interchangeability. A large sales and service organization is available. Incidentally, one effective way of preventing costly shutdowns is to call for a Bliss service inspection of your Bliss presses. A highly competent maintenance man will call on you and the chances are that he will spot trouble before it happens.



The Bliss plant at Hastings, Michigan is specially equipped for quantity production of parts for Inclinable Presses.

These are the reasons—plus the fact that *they are priced right*—that are most often reported by the trade for its preference of Bliss presses.

If your pressed-metal production calls for inclinable presses, you're sure to find the specific answer among Bliss' standard sizes. And a Bliss sales engineer will be on hand to give you unbiased counsel. Remember too, "BLISS" on your press is more than a name...it's a guarantee!

Write today for catalog 2-C illustrating the new Bliss Inclinable Presses and Service Sheet A-110 giving operating and maintenance instructions for the complete line.

E. W. BLISS COMPANY, CANTON, OHIO
E. W. Bliss (England) Ltd., Derby, England
E. W. Bliss Company (Paris), St. Ouen sur Seine, France

U. S. Plants in Canton, Salem and Toledo, Ohio; and Hastings, Michigan. *Branch offices in* Chicago, Cleveland, Dayton, Detroit, Indianapolis, New Haven, New York, Philadelphia, Rochester, Toledo; and Toronto, Canada. *West Coast Representatives:* Moore Machinery Co., Los Angeles and San Francisco; Star Machinery Company, Seattle. *Other dealers in United States cities and throughout the world.*

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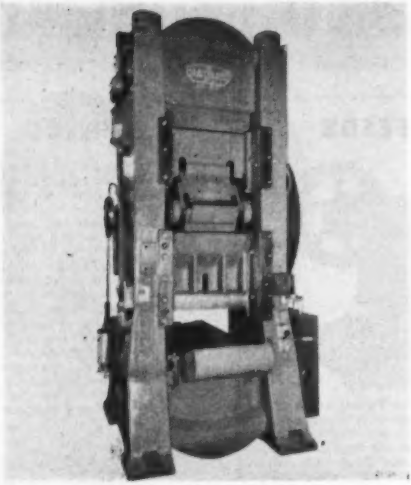
BLISS



Johnson No. 44 inclinable power press

Inclinables developed by Johnson Machine and Press Corp., 620 W. Indiana Ave., Elkhart, Ind., are equipped with their patented non-repeating safety clutch. Double spring activated, it automatically disengages if springs break. Replacing springs takes 30 seconds; no need to remove parts other than those to be replaced, no need to stop the machine.

Features of Johnson inclinable presses include large die space, more than enough power, and easy adaptability to all press operations on metals, plastic sheet material, etc.

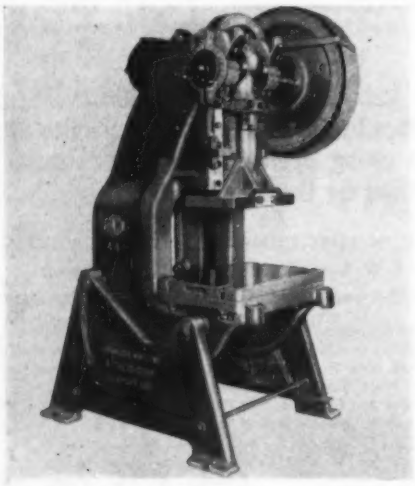
Model No. 44 is built in both flywheel and back-geared types. The back-geared units operate at about half the speed of flywheel types in strokes per minute.

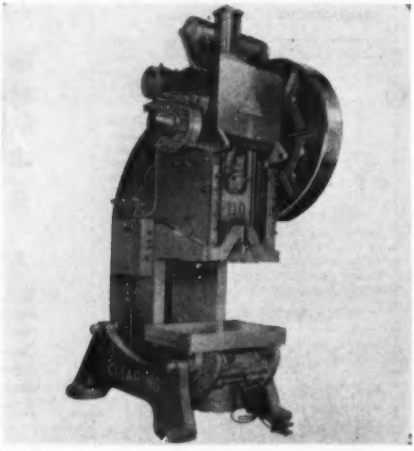
Clearing 110-ton capacity O.B.I.

Clearing heavy tonnage O.B.I's, Clearing Machine Corp., 6499 W. 65th St., Chicago 38, Ill., are heavily built to provide the necessary stiffness and stamina imposed by the work load. Frame design is modified from that of medium capacity presses to provide a heavier support for the main shaft and for the slide.

The relatively longer stroke of these presses emphasizes the importance of long, rigid guiding, easily adjusted for correct clearance. Four slide gibs are used, with both front gibs adjustable.

The presses are engineered so that regardless of the stroke and shut height furnished, the bottom of the slide re-





mains below the gibs at all times, thus allowing the use of overhanging dies.

Diamond 50-ton Multi-Max punch press

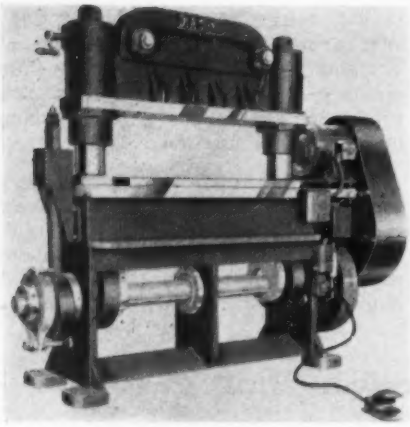
Multi-Max punch presses, product of Diamond Machine Tool Co., 5103 Coffman-Pico Rd., Pico, Calif., are designed principally for metalworking, but are also in operation for many diversified applications. The large bolster and ram areas permit consolidation of blanking and bending operations into one large die, thereby resulting in mass production of uniform parts, enabling close tolerance assembly.

The 50-ton press (Model 5036) claims the following features: all-steel weld construction; underneath double crank pull-down drive; shut die height to order; herringbone gears of heat treated alloy steel; positive brake and counter-

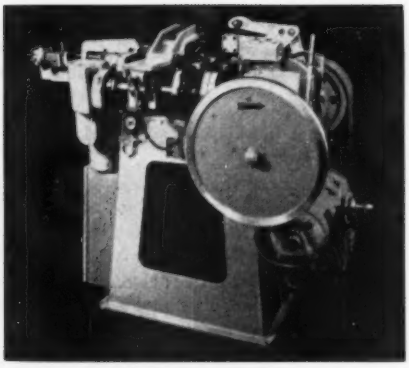
Specifications of American Built Presses

Diamond Machine Tool Co. — **Pico, California**

Type and Model	Capacity	Dia. Crankshaft at Main Bearing and Pin	A=Area of Bed O=Opening in Bed W=Width of Opening in Back	SH=Shut Height ST=Stroke, Std.
O.B.I.				
9	9	1⅝" and 1¾"	A=6½" x 12" O=3" x 5" W=5½"	SH=7"; ST=1½"
15	15	2" and 2¼"	A=8" x 15" O=5" x 7" W=6½"	SH=9"; ST=2"
31	31	3" and 3½"	A=14" x 22" O=7¼" x 10⅝" W=10½"	SH=11"; ST=3"
60	60	4½" and 5½"	A=21½" x 30" O=7¼" x 10⅝" W=13"	SH=16"; ST=5"
Multi-Max				
3024	30	3"	A=14" x 25" O=7" x 20"	SH=10"; ST=2"
3036	30	3"	A=14" x 37" O=7" x 32"	SH=10"; ST=2"
3048	30	3"	A=14" x 49¼" O=7" x 44¼"	SH=10"; ST=2"
3060	30	3"	A=14" x 62" O=7" x 57"	SH=10"; ST=2"
	Multi-Max Punch Presses can be built to special bed and ram sizes in 30 ton capacity. Also available in 60 and 100 ton capacity.			
5024	50	4"	A=15½" x 24" O=7" x 20"	SH=10"; ST=2"
5036	50	4"	A=15½" x 36" O=7" x 32"	SH=10"; ST=2"
5048	50	4"	A=15½" x 48" O=7" x 44"	SH=10"; ST=2"
5060	50	4"	A=15½" x 60" O=7" x 57"	SH=10"; ST=2"
5072	50	4"	A=15½" x 72" O=7" x 69"	SH=10"; ST=2"
5084	50	4"	A=15½" x 84" O=7" x 81"	SH=10"; ST=2"
	Company also makes a Turret Punch Press Model 1212, capacity 10 tons.			



balance with improved new type clutch equilibrator; four-point engaging clutch; electrically operated clutch control; die tryout press; simple conversion into a power squaring shear; electronic non-repeat mechanism.



Multi-Slide Machine

High speed production of complicated parts is accomplished primarily by means of a patented feeding mechanism. Operating between adjustable stops, the feed is always accurate, advancing the stock the exact amount at each revolution. A flat stock straightener is furnished and new coils are inserted without disturbing the setting of the

The Cleveland Punch & Shear Works Company — **Cleveland, Ohio**

Type & Model	Capacity	Dia. Crankshaft at Main Bearing & Pin	A=Area of Bolster O=Opening in Bed B=Between Uprights to Clear	SH=Shut Height ST=Stroke, Std. & Max.
Straight-Sided, Single Crank				
21S	500	10½" and 15"	A=42" x 42" O=22" x 26" B=42"	SH=28" ST=10" and 20"
22S	600	11" and 15½"	A=42" x 44" O=25" x 25" B=44"	SH=29" ST=10" and 21"
25S	750	12½" and 17"	A=50" x 48" O=26" x 26" B=48"	SH=30" ST=12" and 24"
26S	850	13" and 18"	A=52" x 48" O=28" x 28" B=48"	SH=32" ST=13" and 26"
28S	1000	14" and 20"	A=52" x 50" O=30" x 30" B=50"	SH=34" ST=14" and 28"
30S	1150	15" and 21½"	A=54" x 54" O=32" x 32" B=54"	SH=36" ST=14" and 30"
33S	1500	16½" and 23"	A=56" x 56" O=34" x 34" B=56"	SH=38" ST=14" and 34"
34S	1800	17" and 24"	A=60" x 56" O=34" x 34" B=56"	SH=40" ST=16" and 40"

rolls. The straightener can be furnished with power driven intake rolls to facilitate "inching" the stock forward or backward. Every machine is equipped with one die head which is cam operated from the shaft system. The die head accommodates a die set in which may be mounted piercing, trimming and preliminary forming tools. The Multi-Slide machine is made by the U.S. Tool Company, Inc., Ampere (East Orange), N.J.

The Cleveland Punch & Shear Works Company — **Cleveland, Ohio**

Type and Model	Capacity	Dia. Crankshaft at Main Bearing & Pin	B=Between Uprights to Clear	SH=Shut Height ST=Stroke, Std. & Max.
Straight-Sided Double Crank				
45D	75	4½" and 6½"	36", 42", 48", 54", 60", 72", 84"	SH=14"; ST=4" and 8"
50D	90	5" and 7"	do	SH=15"; ST=4" and 9"
55D	110	5½" and 7½"	42", 48", 54", 60", 72", 84"	SH=16"; ST=5" and 10"
60D	130	6" and 8½"	48", 54", 60", 66", 72", 84", 96", 108"	SH=17"; ST=5" and 12"
65D	150	6½" and 9"	48", 54", 60", 66", 72", 84", 96", 108"	SH=18"; ST=6" and 14"
70D	200	7" and 10"	48", 54", 60", 66", 72", 84", 96", 108", 120"	SH=22"; ST=6" and 15"
80D	250	8" and 12"	60", 72", 84", 96", 108", 120", 144"	SH=24"; ST=8" and 16"
90D	350	9" and 13½"	72", 84", 96", 108", 120", 144"	SH=26"; ST=8" and 18"
Knuckle Joint Presses			A=Area of Bed O=Opening in Bed (Dia. inches)	
1½K	150	4" and 5"	A=18" x 18" O=2" B=18"	SH=9"; ST=2" (std.)
2½K	250	4½" and 5¾"	A=20" x 20" O=3" B=20"	SH=11"; ST=2"
4KA	400	5" and 7"	A=30" x 20" O=6" B=20"	SH=14"; ST=3"
4KB	400	5" and 7"	A=30" x 30" O=6" B=30"	SH=17"; ST=5"
6K	600	6" and 8"	A=36" x 36" O=7" B=36"	SH=17"; ST=5"
8K	800	7" and 9"	A=36" x 40" O=9" B=40"	SH=20"; ST=6"
10K	1000	8" and 10"	A=40" x 42" O=10" B=42"	SH=26"; ST=8"
12K	1200	9" and 11"	A=40" x 42" O=11" B=42"	SH=26"; ST=10"
15K	1500	10" and 12¾"	A=42" x 52" O=12" B=52"	SH=34"; ST=12"
20K	2000	11½" and 14"	A=46" x 52" O=14" B=52"	SH=34"; ST=12"
25K	2500	12½" and 15½"	A=50" x 54" O=16" B=54"	SH=34"; ST=12"

The Cleveland Punch & Shear Works Company — Cleveland, Ohio

Type & Model	Capacity	Dia. Crankshaft at Main Bearing & Pin	A=Area of Bolster O=Opening in Bed W=Width of Opening in Back	SH=Shut Height ST=Stroke, Std. & Max.
O.B.I.				
7-1	45	3½" and 5¼"	A=18" x 29" O=12" x 16" W=14"	SH=11¼" ST=3" and 7"
8-1	60	4" and 6"	A=22" x 32" O=14" x 18" W=15"	SH=12" ST=3½" and 7"
9-1	75	4½" and 6½"	A=23" x 34" O=14" x 18" W=18"	SH=17" ST=4" and 7"
9-1A	75	4½" and 6½"	A=33½" x 38½" O=24½" x 24¾" W=23"	SH=17" ST=4" and 7"
10-1	90	5" and 7"	A=27" x 36" O=16" x 20" W=19"	SH=17" ST=5" and 8"
11-1	110	5½" and 7½"	A=28½" x 38" O=16" x 20" W=20"	SH=17" ST=6" and 10"
13-1	150	6½" and 8"	A=30" x 45" O=16" x 20" W=26"	SH=24" ST=6" and 10"
14-1	200	7" and 10½"	A=34" x 48" O=19" x 26" W=27"	SH=24" ST=8" and 11"
Straight-Sided, Single Crank			B=Between Uprights to Clear	
8S	60	4" and 6"	A=18" x 18" O=10" x 10" B=18"	SH=12" ST=4" and 7"
9S	75	4½" and 6½"	A=22" x 22" O=12" x 12" B=22"	SH=13" ST=4" and 8"
10S	90	5" and 7"	A=24" x 24" O=13" x 13" B=24"	SH=15" ST=5" and 9"
11S	110	5½" and 7½"	A=24" x 26" O=13" x 13" B=26"	SH=16" ST=5" and 9"
12S	130	6" and 8½"	A=26" x 26" O=14" x 14" B=26"	SH=17" ST=5" and 10"
13S	150	6½" and 9"	A=27" x 27" O=15" x 15" B=27"	SH=18" ST=5" and 10"
14S	180	7" and 10"	A=28" x 28" O=16" x 18" B=28"	SH=20" ST=5" and 12"
15S	215	7½" and 10¾"	A=29" x 29" O=17" x 19" B=29"	SH=22" ST=6" and 14"
16S	250	8" and 12"	A=30" x 32" O=18" x 21" B=32"	SH=24" ST=6" and 16"
18S	350	9" and 13"	A=36" x 36" O=20" x 26" B=36"	SH=26" ST=8" and 18"

The Cleveland Punch & Shear Works Company — Cleveland, Ohio

Type and Model	Capacity	Dia. Crankshaft at Main Bearing & Pin	B=Between Uprights to Clear A=Area of Bed O=Opening in Bed (Dia. Inches)	SH=Shut Height ST=Stroke, Std. & Max.
Straight-Sided Single Crank Trimming Presses				
8F	60	4″ and 6″	A=22″ x 18″ O=10″ x 10″ B=18″	SH=12″; ST=4″ and 7″
9F	75	4½″ and 6½″	A=24″ x 22″ O=12″ x 12″ B=22″	SH=13″; ST=4″ and 8″
10F	90	5″ and 7″	A=27″ x 24″ O=13″ x 13″ B=24″	SH=15″; ST=5″ and 9″
11F	110	5½″ and 7½″	A=33″ x 26″ O=13″ x 13″ B=26″	SH=16″; ST=5″ and 9″
12F	130	6″ and 8½″	A=40″ x 26″ O=14″ x 14″ B=26″	SH=17″; ST=5″ and 10″
13F	150	6½″ and 9″	A=44″ x 27″ O=15″ x 15″ B=27″	SH=18″; ST=5″ and 10″
14F	180	7″ and 10″	A=48″ x 28″ O=16″ x 18″ B=28″	SH=20″; ST=5″ and 12″
15F	215	7½″ and 10¾″	A=51″ x 29″ O=17″ x 19″ B=29″	SH=22″; ST=6″ and 14″
16F	250	8″ and 12″	A=52″ x 32″ O=18″ x 21″ B=32″	SH=24″; ST=6″ and 16″
18F	350	9″ and 13″	A=56″ x 36″ O=20″ x 26″ B=36″	SH=26″; ST=8″ and 18″
21F	500	10½″ and 15″	A=60″ x 42″ O=22″ x 26″ B=42″	SH=28″; ST=10″ and 20″
22F	600	11″ and 15½″	A=60″ x 44″ O=25″ x 25″ B=44″	SH=29″; ST=10″ and 21″
26F	850	13″ and 18″	A=60″ x 48″ O=28″ x 28″ B=48″	SH=32″; ST=13″ and 26″
Double Crank Trimming Presses				
50-D-36	90		A=33″ x 36″	ST=3″
70-D-54	180		A=40″ x 54″	SH=49¾″; ST=9″

Clearing Machine Corporation — **Chicago, Illinois**

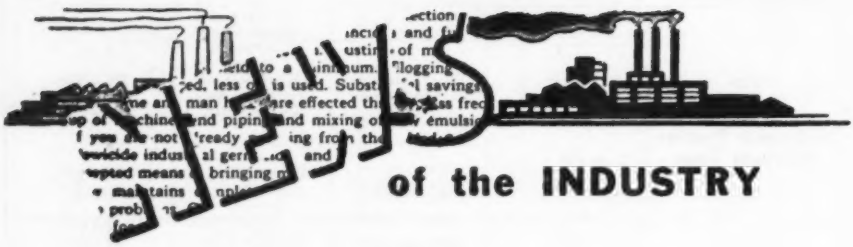
Type & Model	Capacity	Dia. Crankshaft at Main Bearing & Pin	A=Area of Bed O=Opening in Bed W=Width of Opening in Back	SH=Shut Height ST=Stroke, Std. & Max.
O.B.I.				
1-45	45	3¾" and 4¼"	A=18" x 30" O=11" x 14" W=15"	SH=12" (to Bed) ST=4" and 6"
1-60	60	4¼" and 4¾"	A=21" x 32" O=13" x 16½" W=18¾"	SH=13¾"; ST=4" and 7"
1-75	75	4¾" and 5¾"	A=25" x 36" O=14" x 17¾" W=20¾"	SH=15¾"; ST=4" and 8"
1-90	90	5" and 7"	A=27" x 38" O=16" x 18¾" W=20¾"	SH=18"; ST=6" and 8"
1-110	110	5½" and 7½"	A=30" x 39" O=18" x 21¾" W=23"	SH=18⅜"; ST=6" and 10"
1-150	150	6½" and 8½"	A=33" x 50" O=21" x 25½" W=28½"	SH=22½"; ST=6" and 12"
1-200	200	7⅜" and 10½"	A=35" x 54" O=23" x 26¾" W=32⅛"	SH=23½"; ST=8" and 12"
Horn Type				
H-45	45	3¾" and 4¼"	A=24" x 30" O=11" x 14"	SH=8"; ST=4" and 6"
H-60	60	4¼" and 4¾"	A=24" x 32" O=13" x 16½"	SH=10"; ST=4" and 7"
H-75	75	4¾" and 5¾"	A=30" x 36" O=14" x 17¾"	SH=12"; ST=4" and 8"
H-100	100	5½" and 7½"	A=30" x 39" O=18" x 21¾"	SH=14"; ST=6" and 10"
H-150	150	6⅛" and 8½"	A=30" x 50" O=18" x 25½"	SH=16"; ST=6" and 12"
H-200	200	7½" and 10½"	A=30" x 54" O=18" x 26¾"	SH=18"; ST=8" and 12"
Single Crank Straight Side				
	100	5½" and 8"	A=30" x 24" O=18" x 18"	SH=20"; ST=6" and 10"
	125	6" and 8½"	A=30" x 24 O=18" x 18"	SH=22"; ST=6" and 12"
	150	6½" and 9"	A=33" x 27" O=21" x 21"	SH=24"; ST=6" and 12"
	175	7" and 10"	A=33" x 27" O=21" x 21"	SH=26"; ST=8" and 14"
	200	7½" and 10½"	A=36" x 30" O=21" x 21"	SH=26"; ST=8" and 14"
	250	8" and 11"	A=36" x 30" O=21" x 21"	SH=28"; ST=8" and 16"
Double Crank Straight Side	100	5" and 7"	B=Between Uprights to Clear 48", 60", 72" or 84"	SH=20"; ST=6" and 10"
	125	5½" and 7½"	do	SH=22"; ST=6" and 12"
	150	6" and 8¼"	do	SH=24"; ST=6" and 12"
	175	6½" and 9"	do	SH=26"; ST=8" and 14"
	200	7" and 9½"	do	SH=26"; ST=8" and 14"
	250	7½" and 10½"	do	SH=28"; ST=8" and 16"

Johnson Machine & Press Corp. — Elkhart, Ind.

Type and Model	Capacity	Dia. Crankshaft at Main Bearing and Pin	A=Area of Bolster Plate O=Opening in Bed W=Width of Opening in Back, Std. and Max.	SH=Shut Height ST=Stroke
Inclinable Presses Flywheel Type				
1	16	2¼" and 2½"	A=15¾" x 9" O=7½" x 5" W=6½"	SH=9⅜"; ST=1½"
2	22	2½" and 2¾"	A=18½" x 11" O=9¼" x 5" W=9¼"	SH=9"; ST=2"
3	27	2¾" and 3"	A=21½"x12½" O=10½" x 5½" W=10¼"—12"	SH=9⅞"; ST=2½"
33	27	do	A=32" x 16½" O=10½" x 5½" W=21"	SH=12"; ST=2½"
4½	43	3½" and 3⅞"	A=27¼" x 15½" O=14" x 7" W=12⅜"—16"	SH=11½"; ST=3"
44	43	do	A=32" x 22" O=16" x 10¼" W=21"	SH=11½"; ST=4"
5	56	4" and 4⅜"	A=29¾" x 18¾" O=15" x 8⅞" W=12½"	SH=11½"; ST=4"
55	56	do	A=34" x 32" O=20" x 14" W=20"	SH=14"; ST=4"
7	79	4¾" and 5¼"	A=35" x 27" O=18" x 12½" W=16½"	SH=15½"; ST=4"
8	90	5 1/16" and 6½"	A=40½" x 28" O=18¼" x 14" W=18¼"	SH=17¼"; ST=4"
10	116	5¼" and 7½"	A=40½" x 28" O=19¼" x 14¼" W=20½"	SH=17½"; ST=4"
Back-Geared Type	Company also makes all above models, except 1 and 2, in Back-Geared Type.			

U. S. Tool Co., Inc. — Ampere (East Orange), N. J.

Type and Model	Max. Dist. from Center of Front Forming Slide to Extreme End of Angle Plate	Dist. from Face of Angle Plate to Stock Line or Die Face	Width of Ram	SH=Max. Shut Height of Ram ST=Length of Stroke of Ram
Multi-Slide Machines No. 11	12½"	1 3/16"	4"	SH=2¼"; ST=⅛"
No. 28	19⅛"	1⅜"	6½"	SH=3½"; ST=½"
No. 33	30½"	2"	7½"	SH=4"; ST=9/16"
No. 35	39¼"	2¼"	7½"	SH=4½"; ST=¾"



Jones & Lamson, C.I.T. Announce Marketing Service

True leases, installment plans featured in new program

Machine tool users eager for new equipment but shy of the cash purchase price have been offered a flexible and complete financing and leasing plan by Jones & Lamson Machine Co., Springfield, Vt.

The merchandising programs, worked out by J & L with C.I.T. Corp., industrial financing firm, feature a true lease plan running for periods of up to nine years and an installment financing plan with five-year terms. Also available, in addition to straight cash purchase, is a leasing plan permitting an option to buy.

"These plans were created to facilitate the expansion of productivity and markets," said Hardage L. Andrews, president of Jones & Lamson. "They were worked out after long study of the tax and legal aspects of rental contracts and the advantages of installment financing."

Some 60 per cent of U. S. industry's 400,000 lathes are more than 10 years old, Andrews said, and the owners of most of these machines know they should be replaced.

"Industry can no longer afford to operate marginal machine tools," Andrews declared, "when new equipment can be purchased or leased with the savings made by its purchase."

Jones & Lamson's standard line of machine tools includes turret lathes, Fay automatic lathes, thread and form grinders, optical comparators and threading dies. Others are designed for particular jobs.

Four true lease plans are offered, the principal differences being in the annual rental and return charges. With each plan, a 10 per cent deposit is required, to be refunded to the customer upon the fulfillment of the transaction.

The true lease plans include no option to purchase, either at a stated time or at a fixed amount, but the user can make an offer at any time to purchase at a fair market value. There is no obligation on the part of the user to buy,

nor is there any agreement by J & L to sell.

Therefore, said J & L, these plans are true leases and all rental payments are fully deductible for income tax purposes. Customers get the usual one year guarantee with a leased machine and can terminate the lease at the end of any year. The lease may run for nine years.

The firm also offers lease plans giving the customer an option to buy at a stipulated price at the end of any year. "This, we feel," said Andrews, "is an arrangement under which the rental is not deductible for income tax purposes."

Users of machine tools can request an engineering survey of their plants by Jones & Lamson. J & L engineers will gauge the effect of obsolete machines on productive capacity and work out a modernization program which can be paid for out of the savings made possible with new machines.

South Has First Machine Tool Show

Hundreds of southerners attending the R. O. Deaderick machine tool show in Atlanta recently watched demonstrations of ways that up-to-date equipment can cut production time, increase manufacturing efficiency and reduce costs. The show assembled a wide array of machines of fourteen different makers in the exhibition hall of the Atlanta Biltmore Hotel. Cost of putting on the exhibition was estimated at more than $100,000. Value of the machines shown was approximately $1,000,000.

All machines were demonstrated in action by personnel from the manufacturers' plants. Visitors attended the show from all over the Southeast, and some came from northern cities.

It is claimed to have been the first show of its kind ever staged in the South. The R. O. Deaderick Co., the sponsor, is a relatively young firm of manufacturers' agents with headquarters in Knoxville, Tenn., and an Atlanta office.

"Machine tool makers have confidence in the future progress of the South," Dick Deaderick, the company's president, said. "The success of this show makes that clear. I guess we gambled—the manufacturers and my company—when we decided on the show. We couldn't be sure there was enough interest to make

View of part of the Atlanta Biltmore exhibition hall during the three-day machine tool show held by the R. O. Deaderick Co.

A group on the floor of the show at a De Vlieg Jigmil. Left to right, R. O. Deaderick; Charles De Vlieg, of Detroit, president of the De Vlieg Machine Co.; J. H. Murdock, of Combustion Engineering, Inc., Chattanooga, Tenn.; and (seated) John Holcomb, of Wheland, Inc., Chattanooga.

it really go over. But it's gone over fine. We've had a lot of people here and they've been the right people.

"I think this show has started something. There will be more like it in the South. And there will be an increasing awareness of the vital need for up-to-date machine tools in Southern industry. Here in the South we'll have a big market for new machine tools."

Manufacturers exhibiting were as follows: Advance Products, Benton Harbor, Mich.; American Tool Works Co., Cincinnati; Avey Drilling Machine Co., Cincinnati; Bridgeport Machines, Inc., Bridgeport, Conn.; Cone Automatic Machine Co., Windsor, Vt.; Covel Mfg. Co., Benton Harbor, Mich.; De Vlieg Machine Co., Detroit; Gisholt Machine Co., Madison, Wis.; Grob Bros. Inc., Grafton, Wis.; D. C. Morrison Co., Cincinnati; Nebel Machine Tool Co., Cincinnati; Niagara Machine & Tool Wks., Buffalo, N.Y.; Sheldon Machine Co., Inc., Chicago; Turchan Follower Machine Co., Detroit; Van Norman Co., Springfield, Mass.

Pattison leaves W & S

Donald M. Pattison, for the past seven years vice-president in charge of sales, Warner & Swasey Co., Cleveland, has retired to found or buy into some small

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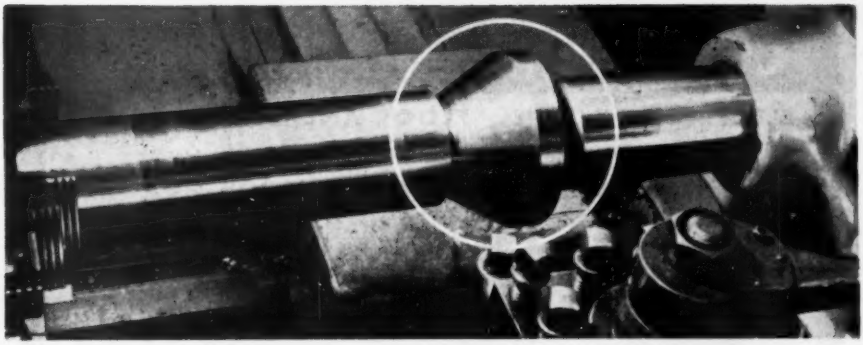
company where he can build a place for his two sons, now out of college.

"Many of us have seen people who spend the last ten years of their business lives talking about something like this and never getting around to doing it. I decided to take the bull by the horns and 'put myself on the beach' so that I would have to act," he said.

Walter A. Sittig inspects and tests a newly completed Rouse hand miller. Sittig, founder of H. B. Rouse and Co., Chicago, recently commemorated his fifty-fifth anniversary as secretary of the firm.



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A large crowd of businessmen viewed Airtherm's Metalworker power press brakes as they were demonstrated under power at the company's St. Louis plant recently. Many of Airtherm's sheet metal products, such as heating equipment, roof decking and tanks, were also on display. A meeting of Airtherm's machinery dealers climaxed the two-evening show.

COOLEY HEAT TREATING FURNACES

ELECTRIC BOX TYPE · FLOOR AND BENCH MODELS

For Tools and Small Parts

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THE COOLEY FLOOR MODEL
for HARDENING AND TEMPERING

Max. Temp.	Sizes	Price
2000°	12″ x 8″ x 18″ 12″ x 8″ x 24″ 12″ x 8″ x 36″ 15″ x 12″ x 30″	$1030 to $1485

All prices are less controls. Any standard controls available for automatic temperature control.

- Cooley modern design provides natural convection—increases uniformity. Heavily insulated large area door makes for low heat loss—reduced power needs.
- Natural thermal convection.
- Easily removable heating elements.

Controlling Pyrometers carried in stock — available for all applications.

Free on request: ☐ COMPLETE CATALOG ☐ "SHOP NOTES ON HEAT TREATING"

COOLEY ELECTRIC MANUFACTURING CORP.
36 SO. SHELBY · INDIANAPOLIS, IND.

Frank C. Wilson

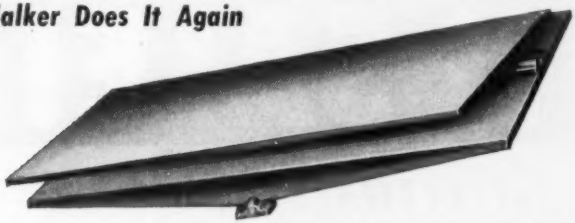
K. R. Wilson, Inc., formed

Incorporation papers have recently been filed for K. R. Wilson, Inc. The newly formed corporation has contracted for the purchase of the machine tool and special automotive service tool business founded by the late **Kirke R. Wilson** in Arcade, N.Y.

Officers and directors are to be: **Egon E. Rassow,** president; **Frank C. Wilson,** chairman of the board and director of engineering; **Manly Fleischmann,** secretary. Additional directors of the corporation will be **Anson F. Sherman** and **James Gordon Devin.**

Egon E. Rassow

Walker Does It Again



Model 836 Universal Vacuum Chuck

The evolution of a satisfied Walker customer:

1. Problem submitted to Walker technicians (75 years' leadership in special designs for chucks).

2. Theoretical research and discussion. (Walker engineers are scientifically trained and are specialists).

3. Practical working models. (Walker engineers and shop men make actual to scale working models). Here is where the application of true scientific principles is utilized.

4. Customer proposal based upon years of experience and a combination of engineering study and practicability.

5. Conclusion: *Another Satisfied Walker Customer.*

O. S. WALKER CO. Inc.

WORCESTER 6, MASSACHUSETTS

Original Designers and Builders of Magnetic Chucks

Newton Co. buys machinery of Hartford plant

The Newton Co., Manchester, Conn., has announced the purchase of the machinery and equipment of American Tool Works of Hartford, Inc. These facilities will be removed from their present location in Hartford to the purchaser's plant in Manchester.

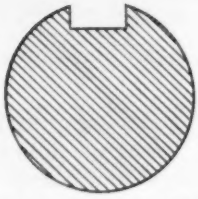
Among the former officers and management of the American Tool Works joining Newton are **John Sundkvist**, founder, who will act as consultant; **Norman Nelson**, who will continue as sales manager, and **Edward Wild**, who will remain as supervisor of the production department.

Stark Tool under new management

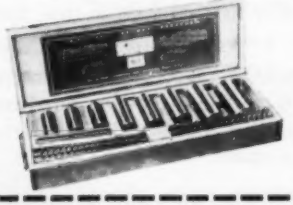
Stark Tool Co., Waltham, Mass., has been purchased by **Richard F. Derbyshire.** Derbyshire has severed all connections with F. W. Derbyshire, Inc., Waltham, with whom he had been associated for 16 years as president, treasurer and general manager.

1¢ SALE!

of KEYWAYS by the minute



Believe it or not, you can cut any keyway from 1/16" to 1" in any bore from 1/4" to 3", by hand, with arbor press, in *one minute* for as little as *one cent* per keyway, with



du Mont
Minute Man
KEYWAY BROACH KITS

The du MONT CORPORATION, Greenfield, Mass.

MAIL FREE KEYWAY BROACH CATALOG and PRICE LIST T describing 25 standard kits, 23 standard sizes of broaches, 71 standard size bushings and a wide variety of production type guideless broaches and square broaches.

Name .....

Company .....

Address .....

Top N.S.C. award to Firth Sterling Inc.

The Award of Honor, highest safety award of the National Safety Council, has been conferred upon Firth Sterling Inc. for the year 1953. **H. H. Brainerd,** executive manager of the Western Pa., Safety Council, local chapter of the or-

Shown left to right, J. T. O'Brien, vice-president-operations; K. D. Mann, president; H. H. Brainerd, executive manager of the Western Pennsylvania Safety Council; and F. J. McKay, director of industrial relations.

REHNBERG-JACOBSON INDEX UNITS

Write for Literature

Complete Index Units have the new "Rim-Ball" table that will support enormous weight, and are made in 16" to 42" sizes for 3 to 12 indexes.

These units are all available for *quick delivery.* You can mount them on structures of your own to make practical and efficient production machine tools.

REHNBERG-JACOBSON MFG. COMPANY

DESIGNERS & BUILDERS OF SPECIAL MACHINERY

R-J

2135 KISHWAUKEE ST. ROCKFORD, ILLINOIS

ganization, presented the plaque to **K. D. Mann**, president of Firth Sterling.

Outstanding in the Firth Sterling 1953 safety record was the occurrence of only 10 loss-time accidents, which were of minor nature with loss time negligible. During a period of nine months the company completed 1,778,915 man hours with no loss-time accidents. It maintained a par rate for frequency of 3.0 compared with the industrial standard of 9.7, while the par rate for severity dropped to .05 compared to the industrial average of 1.20.

Oven manufacturer moves

Grieve-Hendry Co, Inc., manufacturers of laboratory and industrial ovens, are moving their factory to larger space at 1401-17 W. Carroll Ave., Chicago 7, Illinois.

Expansion has been made necessary due to the introduction of new and larger models for industrial processing.

New address

Lafe Resler, manager of the Los Angeles office of the Cincinnati Milling Products Division, has announced that the district office is now located at 3018 E. Olympic Blvd.

Now... From one outstanding source!

All Your Diamond Abrasive Requirements

THE Star Dust LINE!

A COMPLETE RANGE OF LABORATORY GRADED DIAMOND ABRASIVES FOR EVERY PURPOSE

STAR DUST DIAMOND WHEELS AND HONES
Superior diamond quality combined with new bonding formula.

STAR DUST Laboratory graded Pure Diamond Powders

STAR DUST Laboratory graded diamond lapping compounds in 18 gram applicator gun—or in 5 gram ophthalmic tipped tube.

Quick Delivery!

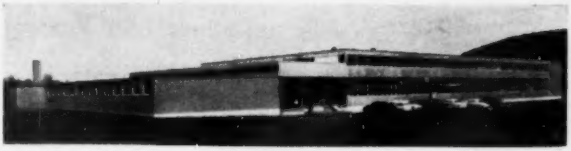
You can put your confidence in the STAR DUST line as so many others do because STAR DUST quality is consistent quality—the result of our special process of laboratory crushing and grading to achieve uniform nodular shape. That means *all* particles work for you. Be "Laps Ahead." For easier grinding and mirror finishes specify STAR DUST products.

Please feel free to make use of our engineering service—and write for catalog No. A-12.

ACE ABRASIVE LABORATORIES

35 ROSELLE STREET MINEOLA, N. Y.

New plant for Hartford Special Machinery



The Hartford Special Machinery Co., Hartford, Conn., has announced the opening of its new 44,000 sq. ft. plant in Simsbury, Conn., the first step in a plan which will ultimately move the firm's entire operation to Simsbury. For the present the new building will be used as an assembly plant. The fabrication of parts and the main offices will continue at Hartford.

HACK SAWS — BAND SAWS

BARNES ROCKET

POWER and HAND HACK SAWS ARE IN DEMAND FOR PRODUCTION CUTTING

GRADIENT HARDNESS

BARNES

1. HIGH SPEED STEEL
2. FLEXIBLE—TOUGH
3. SAFE—SHATTER-PROOF
4. MEETS EVERY SHOP TEST
5. FOR ALL-PURPOSE CUTTING

W. O. BARNES CO., INC.
1287 TERMINAL AVE., DETROIT 12, MICH.

Appointments and Promotions

Name	Company	To	Position
E. R. McClung	American Locomotive Co. Schenectady, N.Y.	Dunkirk, N.Y., branch	Assistant Plant Manager
Lance Masdell	Heckman St. Louis, Mo.	Benchmaster Mfg. Co. Gardena, Calif.	Plant Manager
Edward H. Farmer	Lockheed Aircraft Corp. Burbank, Calif.	E. W. Bliss Co. San Jose, Calif.	Plant Manager
C. Harold Anderson	Bullard Company Bridgeport, Conn.	Same	Chief Engineer
Louis J. Baudis	Bullard Company Bridgeport, Conn.	Same	Vice-President in charge of Manufacturing
Frank U. Hayes	Bullard Company Bridgeport, Conn.	Same	Assistant Sales Manager
W. J. Ulrich	The Carborundum Co. Niagara Falls, N.Y.	Same	Vice-President
Omar V. Greene	The Carpenter Steel Co. Hartford, Conn.	Reading, Pa., branch	General Sales Manager
F. J. McCarty, Jr.	The Carpenter Steel Co. Hartford, Conn.	Same	Branch Manager
J. D. Nelson	The Carpenter Steel Co. Providence, R.I.	Same	Branch Manager
John W. Thompson	The Carpenter Steel Co. Reading, Pa.	Same	Manager of Sales Development
F. J. Weldon	The Carpenter Steel Co. Bridgeport, Conn.	Same	Branch Manager
E. Philbin de Got	Chicago-Latrobe Twist Drill Chicago, Ill.	United Drill & Tool Corp.	Vice-President
Jack F. Anschuetz	Clearing Machine Corp. Chicago, Ill.	Clearing Machine Corp. Hamilton, Ohio	Assistant Sales Manager
William Bredenbeck	Cleveland Auto. Machine Co. Cleveland, Ohio	Same	District Manager
Tom Taggart	Cleveland Auto. Machine Co. Cincinnati, Ohio	Same	District Manager

TEMCO®

ELECTRIC FURNACES

for production line heat treating and heavy-demand process control

More and more plants are selecting highly efficient TEMCO electric furnaces for heat treating dies, parts, tools, etc. and industrial lab work. Series 1700 shown is one of eight convenient sizes . . . with either fully automatic or manual controls. Easy to install and operate . . . economical. $55 to $507.

Write for data and nearest dealer's name.

THERMO ELECTRIC MANUFACTURING CO., 486 HUFF ST., DUBUQUE, IOWA

Name	Company	To	Position
Earl Clark	University of Detroit	Colonial Broach Co. Detroit, Mich.	Sales Representative
Glen Harmon	Colonial Broach Co. Detroit, Mich.	Same	Top Level Engineer
Joseph C. Eppich	Danly Machine Spec., Inc. Cleveland, Ohio	Same	Assistant Branch Manager
Arthur E. Lang	Danly Machine Spec., Inc. Rochester, N.Y.	Same	Branch Manager
Harold J. Staehle	Danly Machine Spec., Inc. Chicago, Ill.	Same	District Sales Manager
Robert R. Hyatt	Denison Engineering Co. Columbus, Ohio	Same	Director of Industrial Relations
Robert H. Krepps	Denison Engineering Co. Columbus, Ohio	Same	Sales Manager
Paul W. Norris	Denison Engineering Co. Columbus, Ohio	Same	Director of Sales
Sam D. McIlwain	Westinghouse Corp. Pittsburgh, Pa.	Detroit Stamping Co. Detroit, Mich.	Product Engineer
John M. Thullen	Harry Ferguson Co. Jenkintown, Pa.	Detroit Stamping Co. Detroit, Mich.	Purchasing Agent
W. Gerard McKee	Henry Disston & Sons, Inc. Philadelphia, Pa.	Same	Steel Div. Representative
Albert E. Boot	Wendt-Sonis Co. Hannibal, Mo.	Firth Sterling, Inc. Pittsburgh, Pa.	Carbide Service Engineer
Donald C. Clark	Firth Sterling, Inc. Pittsburgh, Pa.	Same	Director
Robert F. Frazure	Firth Sterling, Inc. Chicago, Ill.	Same	Assistant District Manager
C. Paul Porterfield	Method X Co., Aff. of Firth Sterling, Inc. Pittsburgh, Pa.	Same	Vice-President and General Manager
Matthew C. Wagner	New Departure Div., General Motors Corp. Bristol, Conn.	Same	Supervisor of Sales Training
Robert H. Wilkie	New Departure Div., General Motors Corp. Bristol, Conn.	Same	Supervisor of Sales Promotion
Bruce H. Lowe	Hydraulic Press Mfg. Co. Detroit, Mich.	Mt. Gilead, Ohio, branch	Sales Engineer
Elton W. Turner	Hydraulic Press Mfg. Co. Detroit, Mich.	Mt. Gilead, Ohio, branch	Sales Engineer
William T. Martin	Landis Tool Co. Indianapolis, Ind.	Home office, Waynesboro, Pa.	Manager
John Meurer	Landis Tool Co. Pittsburgh, Pa.	Indianapolis, Ind., branch	Manager
Eckley Schatzman	Landis Tool Co. Hartford, Conn.	Same	Manager

Get a better 'SURFACE GRINDER" job at less cost

ORDER DIRECT on our 10 day money back guarantee

RADIUS DRESSER $39.00

Diamond $7.00

Hardened shaft—Bearing adjustable for wear Diamond always perfectly centered. Easily set adjustable 180° stops.

10" Wheel size for DoALL and NORTON Grinders—$44.00. Diamond $7.00.

SPECIAL 20" Wheel Size $110.00.

ANGLE DRESSER $44.00

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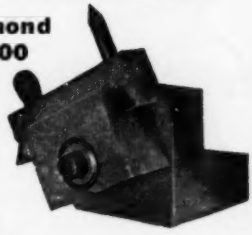


Ball Thrust Bearing. 24

Precision Ground Surfaces. Can be set very accurately with a Protractor or Sine Bar. Works underneath the wheel. Large bearing surfaces.

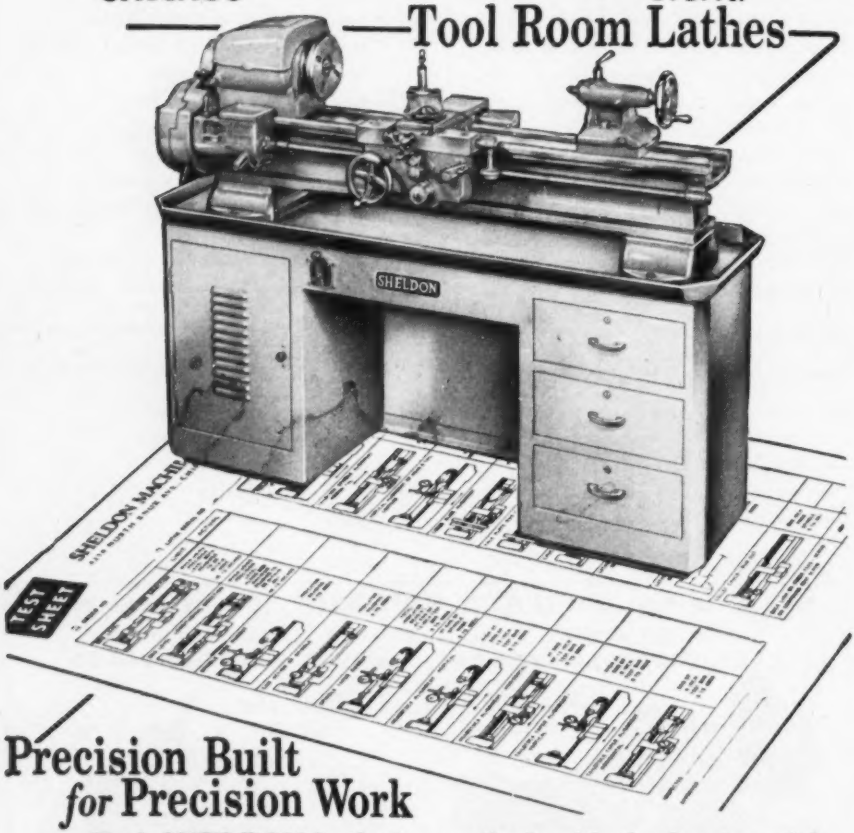
The "Mighty Midget" Line

SPERMAN METAL SPECIALTIES • 2197 E. 21st ST. • BROOKLYN 29, N.Y.

SHELDON

CHICAGO U. S. A.

Tool Room Lathes



Precision Built *for* Precision Work

Each SHELDON Lathe is a precision machine tool that in final inspection has passed the 19 accuracy checks on the SHELDON "Inspection Test Sheet."

Produced by modern methods with the finest special machines, these 10″, 11″ and 12″ (swings 13″) lathes are quality built on a quantity production basis. Selling at quantity production prices they are today's best lathe values.

SHELDON MACHINE CO., INC.

4242 North Knox Ave.,
Chicago 41, Illinois

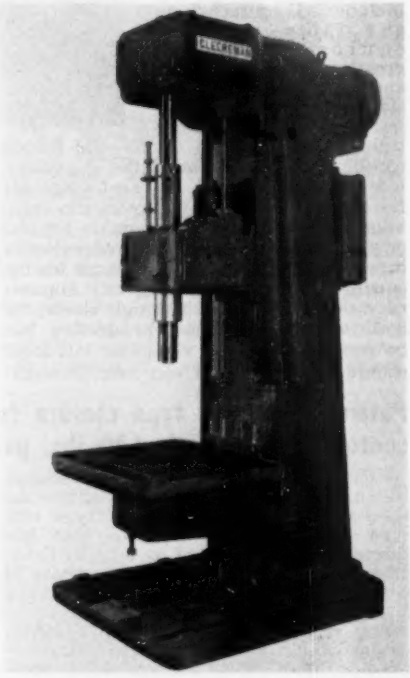
What's New IN METALWORKING

Drilling and Tapping Machines Feature Automatic, Push-Button Operation

Two completely automatic, electro-mechanical drilling machines have been announced by Cleereman Machine Tool Co., affiliated with Bryant Machine & Engineering Co., Dept. BB, 640 W. Washington Blvd., Chicago 6, Ill. Designated as Series A upright drilling and tapping machines, Model AD performs automatic drilling and Model ADT, automatic drilling and tapping. Push-button operation has been achieved by the application of a simple, positive design of unusual nature. The general arrangement and automatic features of the Series A make these machines adaptable for the highest degree of automation and so basically universal in application that they can handle smaller lots of parts than has formerly been considered possible for machines of this type, it is claimed.

In both models the cycle is controlled by dogs. An individual set of dogs for the feed cycle with a micrometer depth control dog and an individual set of dogs for power rapid traverse approach and return are used. The automatic cycle is initiated by touching the cycle button which is normally located at the front of the adjustable spindle. The machines are wired so a foot switch or auxiliary push buttons can be mounted wherever required or wherever is most convenient for the operator. Fixture interlock switches can also be used. The automatic cycle on Model AD is power rapid traverse approach, feed, power rapid traverse return. In addition to this cycle, Model ADT has power rapid traverse approach, tap in, tap out, rapid traverse return for tapping operations.

Speed range is approximately 60 rpm to 1725 rpm with a feed range from boring feeds of approximately .003″ per revolution up through a full range of drilling and reaming feeds to .250″ per revolution. Standard pitches of tap leads up to ¼ pitch are available. Normal equipment is 10 hp drive and No. 5 Morse taper spindle. Various designs of flanged spindles for

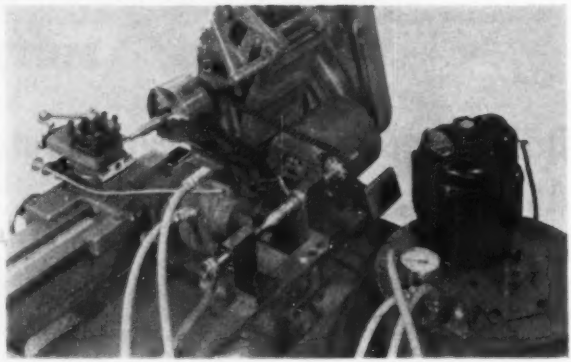


multiple spindle heads can be supplied. Anti-friction bearings are used throughout with automatic lubrication to transmissions. Standard JIC controls and specifications have been followed, and the rugged design gives minimum of deflection.

Single spindle models are available as well as multiple spindle, gang drill types, and the standard top section unit can be furnished alone for mounting on special fixtures, transfer machines, dial units and similar special applications.

Use ACTION Card, opposite page 64, Encircle No. 1

Duplicator is two or three dimensional for engraving



An unusual duplicating attachment recently introduced by Bansbach Machinery Co., Dept. B, 221 N. Cicero Ave., Chicago, Ill., is the Mimik, an attachment that is said to reproduce automatically and accurately on any standard or turret lathe.

Some of the features include: (1) Attaches to any lathe—no special equipment needed—greatly increases scope and usefulness of the standard lathe and can be operated with little training; (2) easy to attach—the Mimik can be put on a standard lathe or grinder, internal and external . . . also adaptable for facing operations; (3) hydraulic operation—a light touch on the guide templet or sample part is multiplied hydraulically into hundreds of pounds pressure on the cutting head, thus making any contour easy to follow, even in tough steels; (4) both volume and short production can be run, copying both right and left hand shoulders, as well as contours throughout the 180° of a templet or sample part . . . one or two dimensional turning in one setting can be obtained.

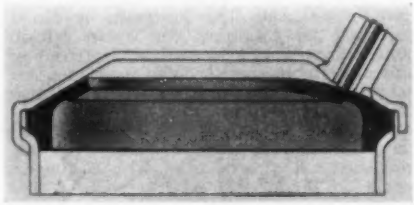
If the part to be reproduced and engraved is made to turn at the same rpm as the machine spindle, the Mimik becomes three dimensional and can be used for reproducing and engraving. The unit is said to be able to change directions 4,420 times per minute or 73 times per second, and cut a continuous chip in each direction with fine detail and finish.

Use ACTION Card, opposite page 64, Encircle No. 2

Patented bayonet type closure for pressure container withstands 600 lbs. psi

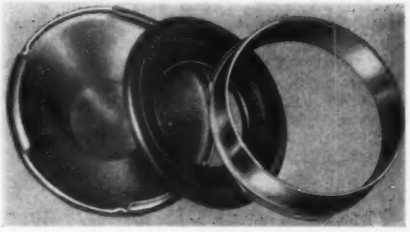
Nilsen Mfg. Co., Carol St., Addison, Ill., is manufacturing a very adaptable, simple yet successful, bayonet type closure for pressure containers, that has recently been expanded to take in fields other than the dairy industry, where it has been field tested extensively, as a dispenser for whipped cream.

The complete unit includes a cover, gasket and bayonet neck (note illustration) for welding or brazing to the container. Self-sealing up to 600 lbs., cover is attached at atmospheric pressure. Gasket seals automatically when internal pressure rises. Inner edge of gasket covers orifice to form a simple, sanitary valve for charging or discharging gas or liquid.



These covers and necks are most generally made of stainless steel but they may be made of any other material suitable to the application, including plastic.

Gasket is usually made of a rubber resistant to oils and fats, non-tasting, non-hardening in heat or cold, making



it entirely suitable for applications such as pressure paint guns, barrel closures, food industry, insecticides, etc.

Claimed to be the only dispenser approved by the U. S. Dept. of Health, the unit has only five parts; some dispensers are made up of as many as 35.

Although the bayonet lock withstands pressure up to 600 lb. psi, at about 400 lb. the gasket comes out between the bayonet lock and cover, thus acting as a safety valve.

A self-charging unit that will be applicable to homes, restaurants, etc., is now in the making. The present unit comes in three models: two models in the 14 oz. size and one in a 22 oz. There are also three methods of filling in common use: filling with "bullets" of CO_2 or N_2O, and multiple gassing and shaking machines where several are filled at once.

Use ACTION Card, opposite page 64, Encircle No. 3

Self-contained automatic drill unit

A self-contained automatic drill unit which operates on a low volume of air was recently announced by the Dumore Co., 1337 17th St., Racine, Wis. The unit, Series 24, is simple to set up, requires only two outside connections—conventional shop air and electric power—and can run on a small portable air compressor.

A hydraulic control accessory which controls the rate of feed is available for drilling hard materials at special angles or on curved surfaces. Because the hydraulic control is separated from the air circuits, repairs at the end of drilling cycles are simple, it is claimed. The hydraulic control when used can be taken out and replaced without the necessity of overhauling the complete unit.

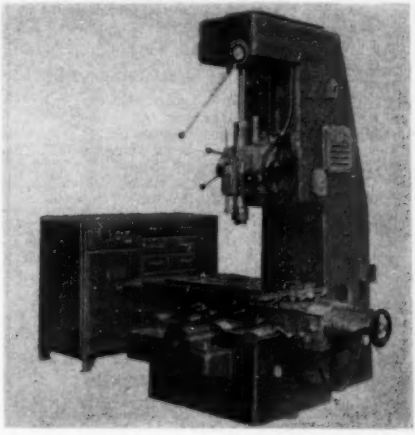
The Series 24 is mounted by the nose bracket, thereby cutting down on setup costs and time. Eliminating the necessity for relays, switches and valves, all of which are built in, the units can be mounted in any combination—radial, vertical, opposed or angular—in standard brackets.

Use ACTION Card, opposite page 64, Encircle No. 4

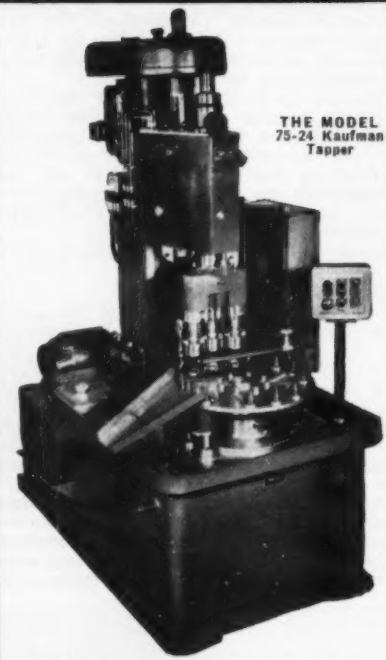
Jig boring machine

On the Newall 2436 vertical jig borer considerable work capacity is obtained by the 24″ x 36″ table having 18″ x 24″ travel. Substantial open-sided construction permits handling of larger work and facilitates operations. Among the features offered are telescoping slide covers on the table ways, rapid traverses for longitudinal and cross movement of table and up and down movement of quill head.

An outstanding spindle and bearing design is employed and an automatic air mist lubrication system gives constant spindle lubrication. The measuring system is divorced from the table movement



KAUFMAN TAPPING MACHINES



THE MODEL 75-24 Kaufman Tapper

Built For Specific Production Jobs

- Single or Multiple Operations
- Precision Depth Control
- Non-reversing Motor Drives
- Pressure Lubricated Lead Screws
- Fast, Accurate, Rugged Index
- Other Head Units Available

And Many Other Worthwhile Features

Send prints and samples of your work for further information and recommendations on how Kaufman Tapping Machines can reduce your production costs.

Catalogs Number 754 and 1153 Mailed on Request

KAUFMAN MFG. CO.
546 SOUTH 29TH STREET
MANITOWOC, WISCONSIN

mechanism and is not subject to wear from the table movement. Two 0.0001" reading micrometer heads in conjunction with zero setting indicators and a system of 1" dia. rollers fixed in position for both longitudinal and cross motion, provide settings of the table to an accuracy of 0.0001". This system permits presetting for table movements during boring operations. Bentley Industrial Corp., 41 E. 42nd St., New York 17, N.Y.

Use ACTION Card, opposite page 64, Encircle No. 5

Two new switches added to line

Two recent additions to the Loxswitch heavy duty limit switch line are a double pole snap action limit switch and a neutral position limit switch. Both are double break switches. The double pole switch (Series L100D) is a single throw switch available for a clockwise or counterclockwise operation and is assembled for n.o. spring return.

The neutral position limit switch (Series L100N) is a single pole, double throw switch, assembled for neutral position operation with both circuits normally open and the lever in a central position. It is a slow make and break switch for pilot circuits only.

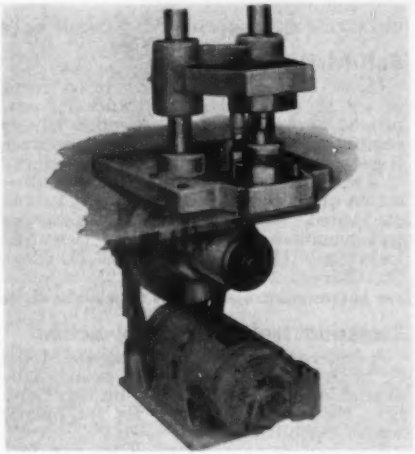
These two switches have a light operating pressure, plus a balanced rotor, graphite bronze bearing and second outboard shaft bearing. A unique trigger-type mechanism is said to provide an extremely fast and accurate break. R. B. Denison Mfg. Co., Dept. BB, 210 St. Clair Ave., N.W., Cleveland 13, Ohio.

Use ACTION Card, opposite page 64, Encircle No. 6

Power press requires no die sets

A new concept in precision power press design has been announced by Swanson Tool & Machine Products Inc., Dept. BB, 816 E. 8th St., Erie, Pa.

Known as the Power-Di press unit, the 1-ton press is said to reduce tooling costs



by eliminating the need for die sets, since punches and dies of any shape may be mounted in retainers which are automatically aligned in opposing ram and bolster members.

Additional features of the unit include a compact design which makes it practical to set several of these units in series for simultaneous piercing, notching or forming operations on large sheets which otherwise would require the use of larger dies and punch presses.

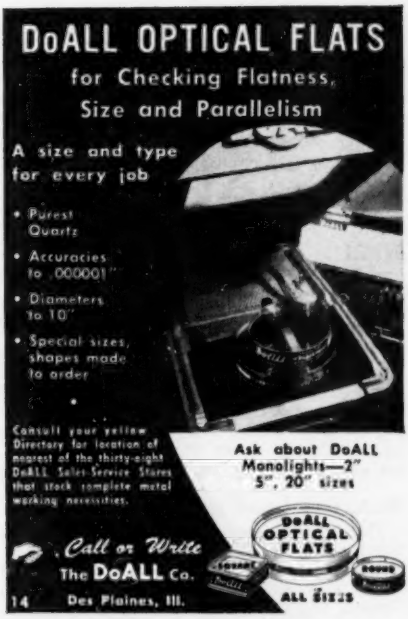
Use ACTION Card, opposite page 64, Encircle No. 7

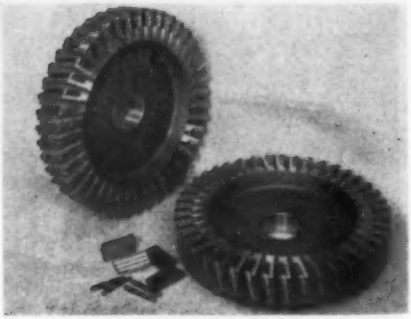
Cutter mills cast iron at 100" per minute

An inserted blade milling cutter series capable of feeds in excess of 100" a minute and employing over four blades per inch of diameter was announced recently by the Wesson Co., Dept. BB, 1220 Woodward Hghts. Blvd., Detroit 20, Mich.

Designed for high feed, cast iron finishing, the new 7200 Series cutter consists of a hardened steel body with broached blade slots, carbide tipped blades and hardened steel wedges.

The wedge applied beneath the blade raises it, causing the blade and body serrations or grooves to lock against each other for positive, firm positioning.


DoALL OPTICAL FLATS
for Checking Flatness, Size and Parallelism
A size and type for every job
• Purest Quartz
• Accuracies to .000001"
• Diameters to 10"
• Special sizes, shapes made to order
Consult your yellow Directory for location of nearest of the thirty-eight DoALL Sales-Service Stores that stock complete metal working necessities.
Ask about DoALL Monolights—2" 5", 20" sizes
DoALL OPTICAL FLATS
ALL SIZES
Call or Write
The DoALL Co.
Des Plaines, Ill.
14



It is this principle, combined with a specially designed blade over 1" high with large steps or grooves, that is employed in the new cutter series, making 4 blades per inch possible. The cutter is available in diameters from 6" to 20".

Use ACTION Card, opposite page 64, Encircle No. 8

Waterless hand cream cleaner

The Straymore Chemical Laboratories, Dept. BB, 48 E. 1st St., New York 3, N.Y., has announced the manufacture of Atlas Stay-Kleen, a waterless hand cream cleaner for the removal of grease, grime, paint, etc. It is claimed to be nonabrasive, pleasantly scented, and to have a germicidal action. It contains lanolin, to soften the skin and prevent chapping.

The cream is packed in 2, 4, 8, or 16 oz. jars, as well as in 5, 7, 10, and 30 lb. and 50 gal. cans and drums for industrial and commercial use.

Use ACTION Card, opposite page 64, Encircle No. 9

Anti-friction compound

Motor-Mica, in white powdered form, is added to regular lubricants for improved performance. A protective silvery coating prevents metal-to-metal contact. Heat and friction are said to be reduced to a minimum, hot bearings cooled, lubrication of air compressors, grinders, valves, etc., aided. For punch presses, die casting and machine shop operations. Scientific Lubricants Co., Dept. BB, 3469 N. Clark St., Chicago 13, Ill.

Use ACTION Card, opposite page 64, Encircle No. 10

Recessing tool with radial action

A new recessing tool, the Amcam Model B, with radial action has been made available by the American Cam Co., Dept. BB, Bloomfield, Conn., for automatic screw machines.

The tool is cam actuated by the for-

THE BETTER BUY

Baldor

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HEAVY DUTY

SHOP GRINDERS

fully guaranteed

With ball-bearings that never require re-lubrication.

AT RIGHT: Baldor Grinder No. 600 series. 1/3 h.p., ball-bearing, dynamically balanced motor. 1 phase, 60 cy., 3450 r.p.m. Two first-grade, individually balanced 6" wheels—1 coarse, 1 fine. Motor stands repeated overloads and WILL NOT BURN OUT. Wide clearance between wheels and motor frame for fast, precision grinding.
It's the Better Buy at $49.00

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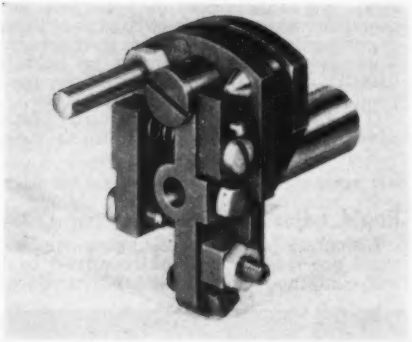
4368 Duncan Ave., ST. LOUIS 10, MO.



ward motion of the turret, thus eliminating the time required for the cross-slide to actuate the tool. In addition, setup time is claimed to be saved since it is not necessary to synchronize lead and cross slide cams.

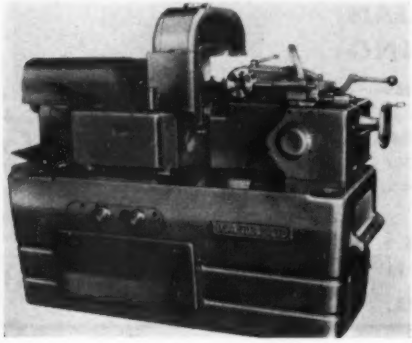
This new tool will perform either radial recessing, form recessing, or back end chamfering without a cross slide, or swing recessing from a cross slide without changes or adaptations.

Use ACTION Card, opposite page 64, Encircle No. 11

British automatics for small parts production

The line of British-built B.S.A. single spindle automatics for small work machined from the bar will be distributed by the National Acme Co., Dept. BB, 170 E. 131st St., Cleveland 8, Ohio.

The screw machines are made in five sizes—½", ¾", 1⅛", 1⅝" and 2". They cover all classes of bar machine work from the smallest to 7¾" diameter. Features are: a wide variety of spindle speeds with automatic speed changes; structural rigidity to maintain high speed precision



You Can Cut Cost Per Hole with DoALL Reamers because:

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2. Faster feeds can be used.
3. DoALL stocks more sizes and types than anyone else.

H. S. Steel

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The DoALL Co.

Des Plaines, Ill. 18

THREAD BROACHING

ENDS TAPPING TROUBLES

Ultra Precision THREAD-CUTTING BROACHES deliver these advantages:

- End tapping trouble
- Produce threaded holes by a Shearcutting action
- Are practically unbreakable
- Ground from hardened high-speed solid blanks
- Require only half the power needed for tapping
- Have an amazing long life
- May be resharpened many times
- Feed the chips out of the hole
- Lower production costs
- Replace standard taps in most sizes

SHEARCUTTER TOOLS COST LESS IN THE LONG RUN

ANOTHER AMAZING INVENTION OF RALPH GORDON FEAR

SHEARCUT TOOL CO.

MANUFACTURERS OF THE WORLD'S MOST SCIENTIFIC CUTTING TOOLS

7041-7045 Denby Avenue Dept BB-91 Reseda, Calif. (L.A. County)

operation; convenience and safety for the operator.

Versatile tooling arrangements and quick changeover from job to job make the B.S.A. single spindle automatics acceptable for both long and short run production on small parts.

Machines are built by B.S.A. Tools Ltd., for 50 years a leading British builder of precision machine tools.

Use ACTION Card, opposite page 64, Encircle No. 12

Diamond dressing tool

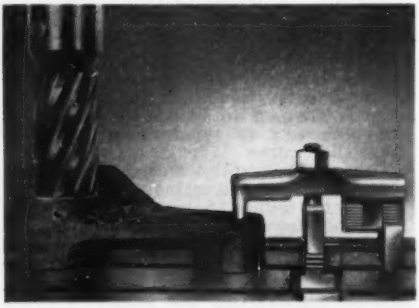
The United Diamond Tool Corp., Dept. BB, 51 Prospect Ave., Lynbrook, L.I., N.Y., has announced an improved diamond dressing tool, developed for dressing the wheel on a Reishauer gear grinder. Tolerances of the tool must be held to 0.00005", due to the accuracy of the gears produced by the Reishauer machine.

Gears may be manufactured from pitches dp-48 to dp-6 with these tools, which are used in pairs.

Use ACTION Card, opposite page 64, Encircle No. 13

Rapid adjustable clamp

Universal tool room clamping applications are said to be readily solved by a self-contained clamp manufactured by



Notch 12 PIPE ENDS per MINUTE
Make Perfect Joints for Welding or Brazing
ARC-FIT
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NOTCHES CLEAN
NO FINISHING
Standard ARC-FIT in hand or power press shears contours for "T" joints for ½" to 2" pipe or tubing with easily interchanged dies. Special ARC-FITS for larger sizes, angles other than 90°, slotting or notching square pipes, angle iron or flat stock.
VOGEL TOOL & DIE CORPORATION
1825 N. 32nd AVE. • MELROSE PARK, ILL.
Send for descriptive literature
Standard Arc-Fit works well in our special HAND PRESS

the Hi-Lo Mfg. Co., Dept. BB, 18525 Weaver Ave., Detroit 28, Mich. Special blocking and shimming and searching for the correct lengths of bolts for each new setup are said to be overcome by the integral design of the clamp rest.

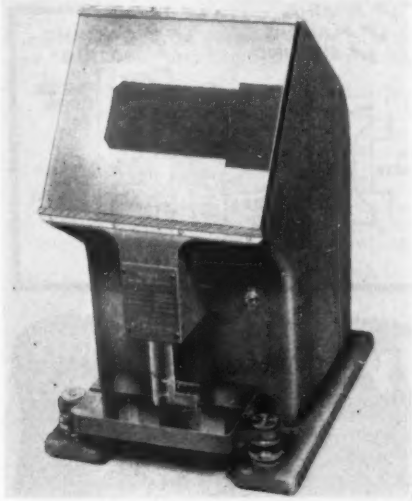
Both the tee bolt and the clamp rest employ a novel serrated feature that makes rapid adjustment possible. Adapters for vertical angle plate clamping are obtainable. The clamp is offered in a wide range of sizes.

Use ACTION Card, opposite page 64, Encircle No. 14

Small parts comparator

The George Scherr Co., 200 MTD Lafayette St., New York 12, N.Y., has announced the development of a new design optical comparator, the Model C, for 100% optical production inspection against an enlarged drawing of small oddly shaped parts. It was designed for optical production inspection only, and is said to combine accuracy, speed, economy, plus operational comfort and convenience.

Features are: (1) horizontal work stage and vertical beam of light permit many parts to be simply laid flat on the stage without holding fixtures; (2) screen and stage are positioned so that they are in line with the operator's hand and vision;



(3) the light source is built back into the instrument; (4) lenses give erect, unreversed image.

Use ACTION Card, opposite page 64, Encircle No. 15

DoALL "CLAW-TOOTH"
SAW BANDS
Cut Faster • Last Longer

- Teeth pull themselves into work
- Cut metals, woods, plastics
- For all contour and cut-off bandsaws
- An "all-purpose" blade

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2, 3, 4, 6 pitch
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or cut and
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Heavy Duty
Live Centers
Write for catalog on live centers

Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

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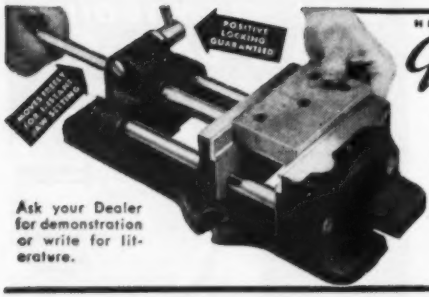

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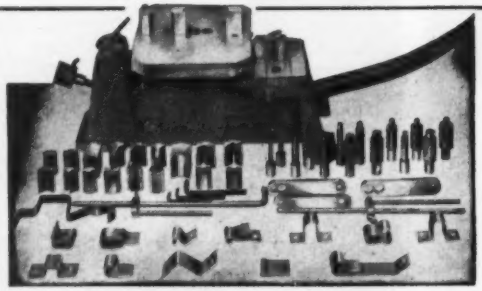
GRIPS WITH SPEED CUTS TOOLING COSTS

Step up drill press production with the Heinrich "Grip-Master" Screwless Vise—with the patented "Circle Grip" hammer blows cannot break. Work is automatically leveled; jaws set instantly, effortlessly. 3", 4", 6", 8" jaw widths; ideal as base structure for drill jigs and fixtures.

HEINRICH TOOLS, INC.

DEPT. 104-J • RACINE, WISCONSIN



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CUTS, BENDS, PUNCHES

Available in hand or air operated models, the MULTIFORM is shipped complete with full assortment of dies and mandrels to punch, bend and cut round or flat brass, bronze, aluminum, steel, etc., up to ⅜" x 1½" as illustrated, other models up to ¼" x 4".

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AIRLOX pat'd wedge-&-lever action utilizes total cylinder drive. Positive rigid grip on the work. Especially suited to CARBIDE MILLING. Five models 50 to 200 tl. air line pressure Write for data sheet. PRODUCTION DEVICES, INC., Whitehall, N. Y

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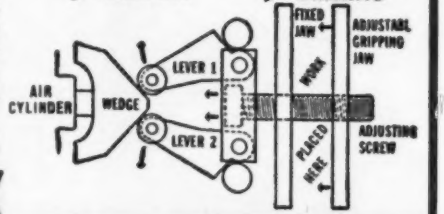


Specify DESTACO Arbor Spacers and Shims

For milling, slitting and gang-saw setups, shimming gears and bearings. Sets in 20 diameters ⅜" to 4" . . . 19 graduated thicknesses .001" to .125", specials over .125". Spacers with keyways, shims without. Stocked by Industrial Distributors.

DESTACO **DETROIT STAMPING COMPANY**

347 MIDLAND AVENUE • DETROIT 3, MICHIGAN

Universal coupling features equilateral tri-lobe shape

Said to be of revolutionary new design, the Kerns Mfg. Corp., Dept. BB, 45-18 Court Square, Long Island City 1, N.Y., has announced the Tri-Lobe universal coupling, with equilateral tri-lobe shape on its driving members.

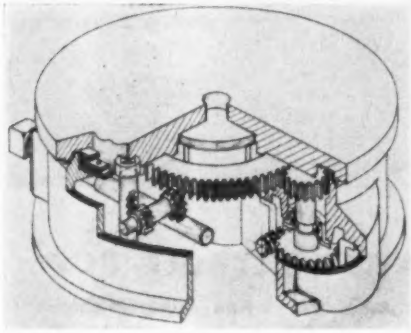
Because of this feature the following factors are claimed to have been made possible: (1) 8° rotational displacement; (2) 15% higher load carrying capacity; (3) a heavier torque rotating load in relation to its weight; (4) coupling is lighter, less costly; (5) mechanical efficiency with a high safety factor; (6) bearing contact is 85% of total driving area displacement; (7) working surfaces finish ground to maximum 10 mu. in. rms—final shape can be ground from the hardened blank, thereby avoiding distortion; (8) engagement between male and female members held to max. 0.0002″ side clearance; (9) curvilinear profile permits inspection with conventional instruments used for checking circular work; (10) driving members are self-centering under loads.

Use ACTION Card, opposite page 64, Encircle No. 16

Built-in safety features for index tables

An index table, of which the built-in safety features are said to be virtually foolproof, has been announced by Michigan Drill Head Co., Dept. BB, Detroit 34, Mich.

The table is driven by a fluid-drive motor, assuring maximum safety should an electrical failure occur in other units. The table will stop automatically in the event of a drill head or other unit engaging the fixture. This safety feature makes it impossible for an operator to get caught in the table. The driving load is controlled from the fastest point on



DoALL Granite
SURFACE PLATES
Non-Rusting • Non-Magnetic • Utmost Accuracy • Cheaper Than Metal Plates
• Wear Free
• Shock Proof
• Harder than hardened steel
• Velvet Smooth
• Unsurpassed for Production, Inspection and Layout Work
SIZES SHAPES AND ACCURACIES FOR EVERY REQUIREMENT
Consult your yellow Directory for location of nearest of the thirty-eight DoALL Sales-Service Stores that stock complete metal working necessities.
INDIVIDUAL Working Flats only $22.50 Ea.
DoALL
2" x 8" x 12"
.0002" Surface Accuracy
Call or Write
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MICRO-HEIGHT GAUGE

BY FAIRFIELD GAUGE CO.

NO OTHER GAUGE COMPARES FOR FAST, ACCURATE LAYOUT AND MEASURING

Capacities to 6″ when used with this Fairfield Gauge 3″ Riser

The Micro-Height Gauge is a precision instrument, finished in satin chrome, which reads like a micrometer and measures from zero at base to 3″ in thousandths. Use as a scriber for fast layout, or insert dial indicator for quick, accurate inspection.

Exclusive distributor for U.S. and Canada:

CLEVELAND INSTRUMENT CO.

735 Carnegie Ave., Cleveland, O.

the table. A decelerating valve shuts off the oil supply just before the shot bolt is placed in the cup, providing smooth operation.

The line drawing cut-away shows the simplicity of design—merely a worm and a worm gear, with a large gear driven from a point near the outside diameter of the table. Tables come in four sizes—20″, 30″, 42″ and 60″.

Use ACTION Card, opposite page 64. Encircle No. 17

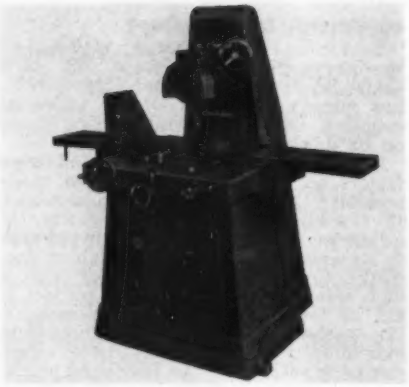
Hydraulic surface grinder

The 10″ x 24″ Astra hydraulic surface grinder has ample grinding width, fully hydraulic movements, and rapid traverses for table and wheelhead.

The spindle is mounted in precision roller, ball and thrust bearings and is driven by a 2 h.p. motor in a vibration absorbing mount.

A diamond dresser built into the wheelhead permits instant dressing without changing settings or removing work from the machine. A mist type coolant system is supplied as standard equipment. Power rapid traverses are provided for the movement of the table and wheelhead, eliminating much manual cranking.

The ways of the table are automatically lubricated through the hydraulic system



of the machine. Graham Machine Tool Co., Dept. BB, 19 Cleveland Pl., New York 12, N.Y.

Use ACTION Card, opposite page 64. Encircle No. 18

Bench lathe

Small bench lathe made by Stark Tool Co., Dept. BB, Waltham 54, Mass., for second operation work with quick opening head and lever action tailstock, can

STOP DUSTS INSTANTLY

with

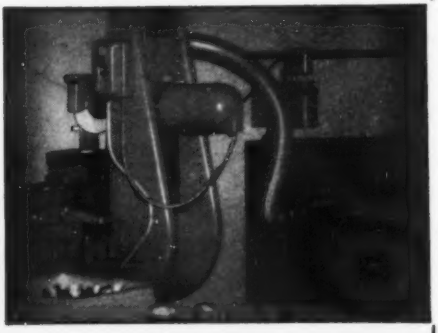
DUSTKOP

Available from stock of 32 standard models

300 cfm to 10,000 cfm

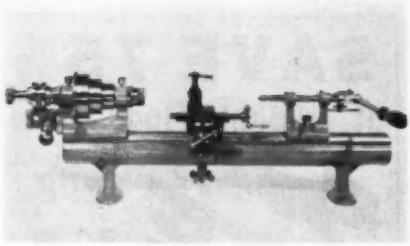
for: Surface Grinders, Tool and Cutter Grinders; Polishers and Buffers; Abrasive Belts and Discs; Woodworking and Plastic Industry Equipment . . . DUSTKOPS collect almost all kinds of industrial dusts.

Ask for Catalog 605-3. Describe dust problems for recommendation by return mail — no obligation.



AGET-DETROIT CO.

502 Main St. Ann Arbor, Michigan



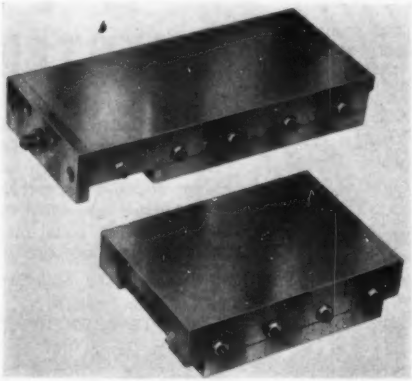
be equipped with standard compound slide rest, forming slide rest, or double compound with swivel tool block. Collets through capacity ½". Step collets any length to 3", any diameter to 4". Concentricity of headstock spindle .0001".

Use ACTION Card, opposite page 64, Encircle No. 19

Standard slide assemblies

Standard slide assemblies which can be used to speed the design and manufacture of special production machines are now offered by Russell T. Gilman, Inc., Dept. SB, 2410 N. Farwell Ave., Milwaukee 11, Wis. A selection of 52 convenient types and sizes is available. The size range runs from 2" to 6" in width, with lengths from 3" to 16".

The slides move on dovetail ways. Male and female members are said to be made from iron having high tensile strength and properly treated to eliminate distortion. Top and bottom surfaces of both members are precision machined and ground parallel. Gibs with adjusting screws are provided for regulating the clearance and compensating for wear as required.



Use ACTION Card, opposite page 64, Encircle No. 20

See DoALL'S New
PRODUCTO-CHEK
Mechanical Comparator

- Low Cost
- Extreme Accuracy
- Speeds Inspection
- Direct Reading
- Reduces Error
- No gears, lever, racks.

For a demonstration, see yellow directory for DoALL Sales Service Store that stocks complete line of gaging specialties.

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The DoALL Co.
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.0001", .00005" and .000010" gaging heads.

HYPNEUMAT
HIGH SPEED-AUTOMATIC
DRILLING-TAPPING UNITS

Drill-Tap without Tapping Head or Lead Screws.

$197.50
for basic model 350
Model 350 EHB shown

VARIABLE STROKE
3½" to 12"
⅜" DRILLING CAP. IN STEEL
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- Sealed Unit-Mount any angle
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- Easily Interlocked with Index Tables
- Exclusive Quill Extension-Close Grouping

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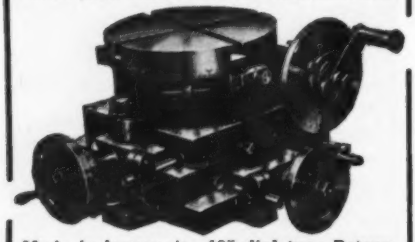
647 W. VIRGINIA ST. MILWAUKEE, WISC.

The *STEVENS* Line
SINCE 1925

Showing 7½" Dial Type Rotary Table mounted on compound table No. 1
-Traverse and Circular Movements-



Made in larger size 12" dial type Rotary-compound table No. 2. Either unit usable separately. Five sizes of Rotary Tables. Adjustable tilting tables. Multiple spindle index centers. Screw head slotters. Vises.

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The JOHN B. STEVENS Company
SOMERSVILLE, CONN.

SAVE 75%
of Valuable Floor Space

with YOHE RACKS

Keep bar stock on handy Yohe racks. Save space. Save time. Stock always visible and available. Assures safety in handling. Weight capacity 10,000 lbs. with 3 stands. Over 90% of users send repeat orders. Write for literature and prices today.

Make double racks by placing back to back

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ALL FE GAGES are

Made by skilled workmen from highest quality material. Constant size and continued accuracy are assured by sub-zero treatment. Each gage rigidly inspected.

Emergency situations in your plant solved by our unusually prompt delivery.

We specialize in large size ring gages. Write for 8-page descriptive catalog.

THE FARMINGTON ENGINEERING CO.
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*NIROL *the* incomparable COMPENSATING LIVE CENTER

Permits perfect support of all loads and thrusts. Reduced overhang adds rigidity and increases machine capacity. Compensating factor provides for work expansion from heat while machining.

Write for complete information.

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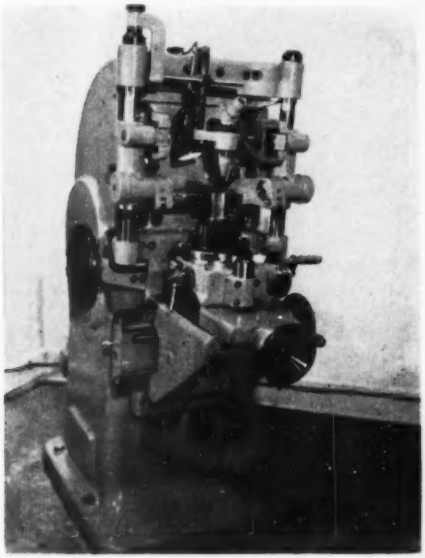
900 HIGHWAY 22, N. PLAINFIELD, N. J.

Punch forming and shaping machine

The Nassovia-Thiel punch forming and shaping machine with slotting attachment, Type 32-ST, is intended for the preparation of cutting and punching tools, molds for plastics, numerous special tools, and jigs for non-cutting production methods. Only simple shaping tools are used.

In spite of any complexity of punch form, it is possible with the 32-ST to maintain angular precision of the profile



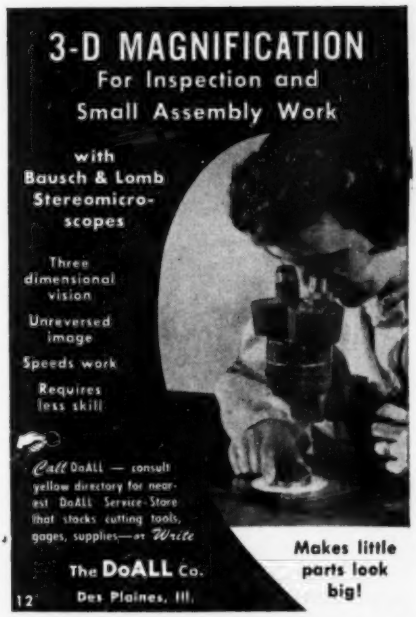
and parallelism of the surfaces within 0.01 mm limits. This eliminates time-wasting hand operations.

Data: number of strokes per min., 33-47-66 and 40-57-81; slotting motion, maximum stroke 6", minimum stroke 2"; swivel motion, from 0° to 90°, radius, ⅛" to 2"; feed. roughing per stroke up to 0.03", finishing per stroke from 0.002", longitudinal automatic advance by hand, 0.0008". Carl Hirschmann Co., Dept. BB, 30 Park Ave., Manhasset, L.I., N.Y.

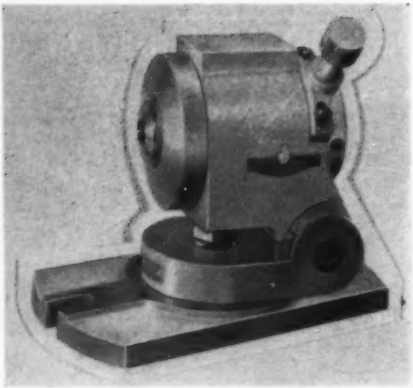
Use ACTION Card, opposite page 64, Encircle No. 21

Universal dividing collet head

Kuma Tool Co., Dept. BB, 8751 S. State St., Chicago 19, Ill., has announced the Model C-404 precision universal dividing collet head for milling, drilling, counterboring, reaming, tapping, grinding of equal or irregular circular spacings. Tool



BORE
HOLES
Also other polynominal profiles—male or female—with taper if required. Less than .020" corner radius; ±.0005" accuracy. For special shapes templates of ¼" nylon can be machined in 15 minutes and re-useable whenever needed. Costly hours reduced to mere minutes with Alina Profile-Boring Head.
DEALER TERRITORIES OPEN
BANSBACH MCHY. CO. 221 N. CICERO AVE. CHICAGO 44, ILL.



is adaptable: for collet grinding on external grinder; as an angle dresser with the use of the CA775 angle wheel dressing attachment; as a radius dresser with the use of the CA785 radius dressing attachment; to mount a 3-jaw or 4-jaw chuck by the use of the CA795 chuck adapter.

Use ACTION Card, opposite page 64, Encircle No. 22

Toggle action table clamp

The Robert J. Kelly Mfg. Co., Dept. BB, P.O. Box 4938, Redford Sta., Detroit 19, Mich., has announced the recent addition of clamp Model No. 801 to its line of toggle clamps.

This table clamp comes equipped with an adjustable bolt retainer and solid steel L shaped base which facilitates the clamp installation on flat surfaces or slotted machine tables.

Added feature of the bolt retainer pro-

COMPLETE LIQUIDATION!
MACHINE TOOLING
Parts • Accessories • Attachments for All Standard Make Machines
TURRET LATHES • MILLING MACHINES • ENGINE LATHES
AUTOMATICS • GRINDERS • HONES • DRILL PRESSES • ETC.
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Sale Under Supervision of
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U. S. INDUSTRIAL TOOLS
Phone
Michigan 7891
416 So. Central Ave., Los Angeles 13, Calif.

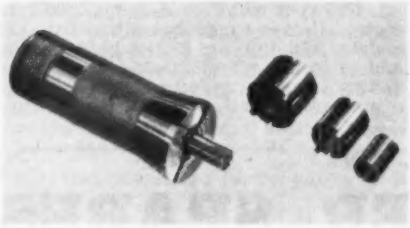
vides for angular adjustment of the pressure foot assembly from zero to 90° to facilitate clamping on flat or inclined work.

Clamping pressure varies from light to a force in excess of 700 lb. Ample hand clearance is provided between the handle and toggle bar when the clamp is opened to its full limit.

Use ACTION Card, opposite page 64, Encircle No. 23

Expanding collet arbor for concentricity, squareness to the bore

The Medelton Co., Inc., Dept. BB, 335 E. 142nd St., Bronx 54, N.Y., has announced the Hole-True expanding collet arbor for secondary turning and facing operations, where concentricity and/or squareness to the bore are desired. Setup time is claimed to be minimized because there are no arbors to turn, no mandrils to align. Hole-True is simply inserted in place of a standard 5C collet, the proper



adapter is slipped on, and the machine is ready for production.

Reasons given for the efficiency of this bore-holding device are: Hole-True connects to and is activated directly by the drawbar; no wrenches or keys to handle; shoulder distances held precisely, even though the bore sizes vary.

The product is available in sets consisting of master collet arbor and three adapters to hold in 3/8", 1/2", 3/4" and 1" bores.

Use ACTION Card, opposite page 64, Encircle No. 24

Speeds and feeds increased with planer tools

New heavy duty horizontal and vertical clamped-on carbide tip planer tools have been announced by Davis Boring Tool Div. of Giddings & Lewis Machine Tool Co., 142 Doty St., Fond du Lac, Wis.

Both iron and steel can be planed with the tools. Speeds and feeds are said to be greatly increased through their use, partially because of the rigidity of the

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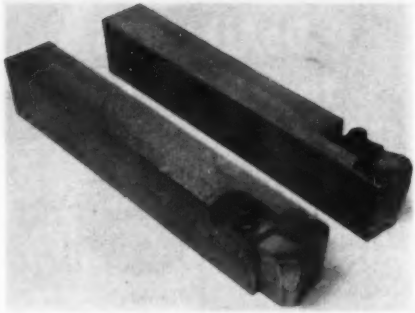

tool holder, but principally as a result of the stability of the back-up wedge.

Twice the amount of planing can be completed with a single grind, it is claimed.

Use ACTION Card, opposite page 64, Encircle No. 25

Improved adjustable recessing tool

A recessing tool of improved design is being manufactured by R and L Tools, Dept. MB, 1825 Bristol St., Philadelphia 40, Pa.

It can be adjusted to operate on any internal diameter within the capacity of the machine, as well as on outside diameters for cutting grooves or similar operations, the company claims.

Depth of recess cut and the recess diameter can be finely adjusted by loosening one and tightening the other of two adjusting screws. A zero reference line is engraved on the adjusting sleeve and intermediate sleeve to show the operator how much and in which direction the cutting tool has been adjusted. Maximum depth of recess that can be cut is approximately 3/32" to ⅛". The tools are available in three sizes with shank diameters of ⅝", ¾" and 1".

Use ACTION Card, opposite page 64, Encircle No. 26

Hammond adds new polishing and buffing head

Hammond Machinery Builders, Inc., has announced a new heavy-duty, full-floating, adjustable polishing and buffing head and stand unit, Model 52-100.

It will accommodate either a 10 or 15 hp, 1750 rpm motor or a 20 hp, 3500 rpm motor. Unit is ruggedly constructed (net weight 2500 lb.) for heavy buffing jobs and to insure vibrationless operation resulting in more uniform finishes. It has a maximum float of 6" and can be fur-

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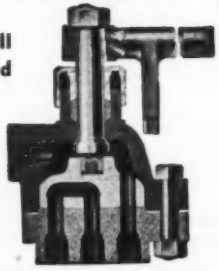
Because Nicholson control valves are suitable for all mediums, they offer maximum use for interchange and replacement purposes. Unlike many poppet or balanced-piston valves, they can be used for steam as well as air, gas, oil or water. A prominent rubber firm reports that they carry only one spare valve for each 52 in service. Also a larger choice of metal combinations. Lever, foot, solenoid, motor types; size ¼" to 2½"; pressures to 5,000 lbs.



CATALOG 552

117 Oregon St., Wilkes-Barre, Pa.

W. H. NICHOLSON & CO.

TRAPS · VALVES · FLOATS

nished with power feed for vertical lift or horizontal traverse.

Model 52-100, which can be assembled for either right or left hand operator, was designed especially for use with Strait-Line automatic buffing machines. It can also be used with rotary automatics or as individual polishing and buffing stands similar to polishing and buffing lathes.

Use ACTION Card, opposite page 64, Encircle No. 27

Pope plate bending rolls offer combined Kling-Pope resources

Pope Machine Co., Inc., Seattle, Washington, recently purchased by Kling Bros. Engineering Works, Chicago, now announces a complete line of rolls for every purpose, representing the combined experience and facilities of both companies.

The Pope plate bending rolls are of all steel construction and include both the pyramid and initial pinch types used in industrial plants of all kinds for rolling steel, aluminum, and other nonferrous plate.

The No. 3 initial pinch type roll makes possible rolling speeds up to 30' per minute. Features include solenoid brake, heavy structural frame with cast steel housings and all cut steel gears in drive. There is special provision for rolling small diameters. Pope Machine Co., Inc., Dept. MB, 5201 S. First Street, Seattle, Wash.

Use ACTION Card, opposite page 64, Encircle No. 28

HOLLOW-FRAME MICROMETERS

Reduce Gaging Errors

Up to 50% less weight

•

Lessens fatigue, assures accurate gaging, better balance and feel

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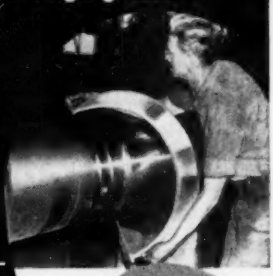
Minimizes expansion and contraction



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FOR HOLES FROM
1/16" UPWARD
17 DIFFERENT SIZES
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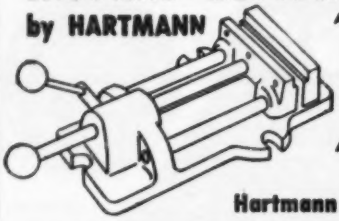
INSTANT ACTION **RAPIDSET**
by HARTMANN



All Purpose Tool Room and Machine Shop Vises.

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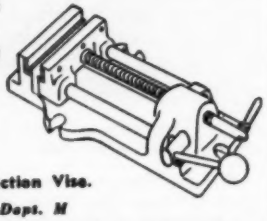
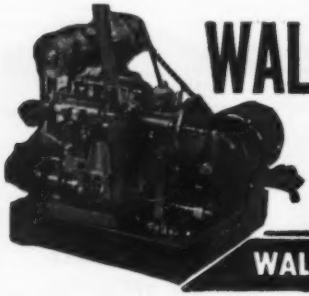
Adjustable Pressure Production Vise.



For Information Write Dept. M
Hartmann Mfg. Co., 1637 Goold St., Racine, Wisconsin



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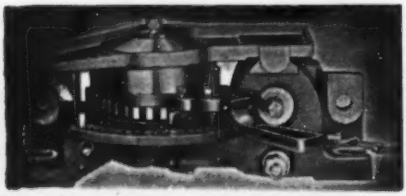
These machines are finished according to the work to be done. Send samples or dimensioned drawings and tell us about the cutting qualities of the material and probable production per week or month. Then wait for our reply with bulletin.

WALTHAM MACHINE WORKS WALTHAM 54 MASSACHUSETTS

MODEL H . . . AUTOMATIC CHUCKING and INDEXING FIXTURE



1. 1800 light cuts per hour.
2. Either horizontal or vertical position.
3. Collets changed instantly.
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5. Ratchet or degree indexing—degree indexing added later if desired. Capacity 1".
6. Automatic indexer also added later. Model F—Both degree & ratchet indexing. Capacity up to 2¼".

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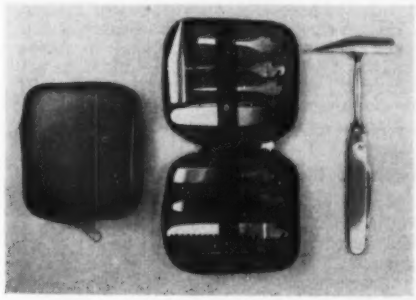
J. W. DEARBORN, Ansonia, Conn.

Traveler tool kit

A miniature tool kit of exquisite workmanship and practical design contains eight useful tools. Although only slightly larger than a package of cigarettes, this set contains hammer, wood chisel, saw, file, drill, punch, screwdriver and jack



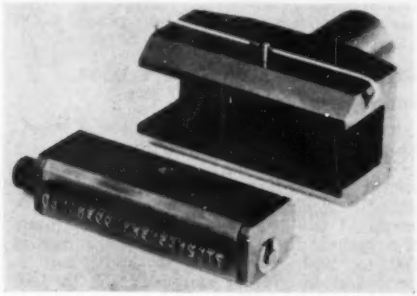
knife, together with a snap-on handle which holds each tool in turn. All the tools are securely mounted in a zippered cowhide case. Made by Hugo Berns of Germany and distributed by the Abbeon Supply Co., Dept. BB, 179 Jamaica Ave., Jamaica 32, N.Y.

Use ACTION Card, opposite page 64. Encircle No. 29

Quick-change holders for steel type

A line of quick-change holders for steel type has been developed by Heidrich-Nourse Co., Dept. BB, 631 E. Third St., Los Angeles 13.

The type holders were brought out to provide a mechanism that would stand up under high impact loads and at the same time permit rapid change of type setup. They work similarly to quick-change tool posts for engine lathes, and may be used in punch presses, squeezers,



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Use the DoALL Micro-Step Gaging System

Any Gage, including indicating types made with Micro-Step instruments

Fully exposed end measuring surfaces.

Call DoALL locally for free demonstration, or write:

The DoALL Co. Des Plaines, Ill.

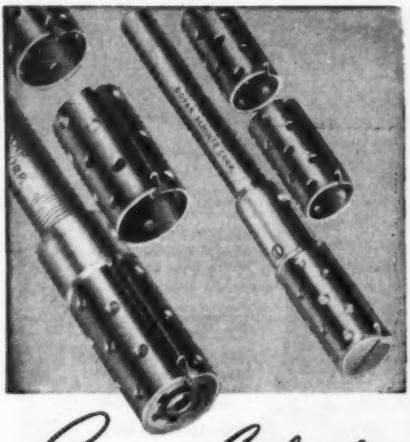
SELECT END STANDARDS from Micro-Step Set

ASSEMBLE—place gage blocks into channels; snap pins through end standards.

TIGHTEN CLAMPS—that's all there is to it!

39

No. HU68—Hydraulic rail feed universal joint type multiple spindle drilling machine.
For Over 50 Years
MOLINE "Hole-Hog"
Specially Designed
MACHINE TOOLS
MOLINE TOOL CO.
have cut production costs for American Industry.



Boyar-Schultz

COPPER HEAD LAPS

. . . . are accurate, fast working and easy to use. They are much less costly than making laps in your own tool room. Because the only wearing part is the inexpensive copper sleeve they are long lasting.

Unlike laps made for specific jobs, they are used over and over again, changing only the sleeves. Adjustment permits correct lapping size to be maintained till sleeve is worn out and replaced with a new one. Thus, with Boyar-Schulz Copper Head Laps you save tool room time and get accurate, speedy lapping.

Copper Head Laps and Sleeves are immediately available from stock, in standard sizes ⅛" to 2½" diameters.

SPECIAL TOOL MAKERS BENCH LAP SET

Consists of seven most commonly used sizes—⅛"-3/16"-¼"-5/16"-⅜" 7/16"-½", with enameled die cast base.

BOYAR-SCHULTZ CORPORATION
2008 So. 25th Avenue, Dept. D-L
Broadview, (Chicago) Illinois

impact machines, air and hydraulic presses, etc.

The unit consists of a chuck with shank—which normally stays locked in the machine—and a removable type-holding insert. The insert is held in the chuck by a spring-loaded positioning plug. It is removable by thumb pressure, but hard thumping by the machine will not dislodge it, the manufacturer claims.

Holders come in single and double line capacities, with type recesses in three lengths: 1", 1½" and 2½". Shank sizes are ¾" or 1", with other sizes from ½" to 2" available on order.

Use ACTION Card, opposite page 64, Encircle No. 30

Vertical mill permits 90° turn

Masters Machinery Supply Co., Dept. BB, 3613 Archer Ave., Chicago 9, Ill., has announced a new vertical mill for production and tool room drilling.

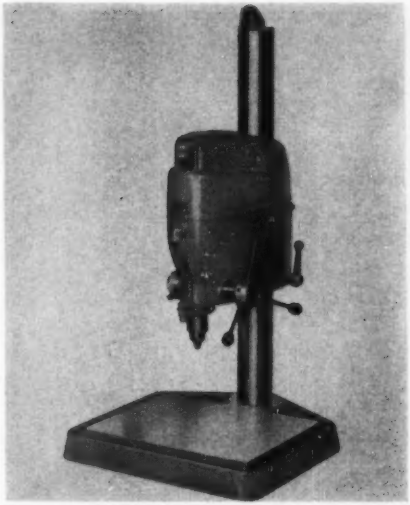
The mill has a swivel-type head permitting a full turn of 90°, and a 12" clearance below the spindle. It has a direct gear drive assembly, coupled with a 2-speed 1 hp motor. A quick change of speeds permits 8 speeds, ranging from 125 to 1540 rpm. The ball and roller bearing mounted spindle has a hand wheel feed with a 4½" travel and a quick return. The heavily constructed feed table has 11" longitudinal travel and a 6½" cross feed travel. The operator of the mill can be close to his work because the heavy casting base has been designed with a cutaway front.

The new mill was designed by Stanley Masters and is manufactured for Masters Machinery Supply Co. by the same firm in Sweden that builds Masters' line of radial drill presses.

Use ACTION Card, opposite page 64, Encircle No. 31

Drilling machines feature wide range, variable speed

The Electro-Mechano wide range, variable speed 16" precision drilling machines are completely enclosed with built-in motor for safety. No belt shifting for spindle speed change is necessary. A knob at the top of the machine adjusts the speed. In direct drive the range is 600 to 5000 rpm. A gear reduction is provided to give a range of 150 to 1000

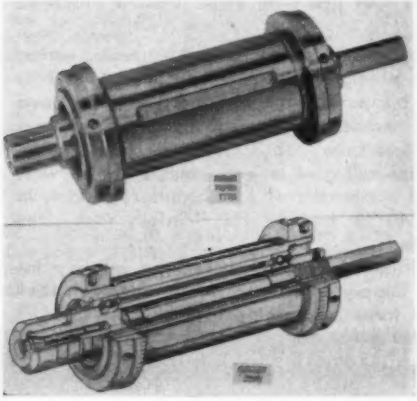


rpm for flycutting, working hard materials, etc. A clamp type depth stop saves time on setups. The Electro-Mechano Co., 263A E. Erie St., Milwaukee, Wis.

Use ACTION Card, opposite page 64. Encircle No. 32

Standard spindle line speeds special machine construction

A new line of standard spindle assemblies which the manufacturer claims can be used profitably to simplify designing and manufacturing of special machines has been announced by Russell T. Gilman, Inc., Dept. BB, 2410 N. Farwell



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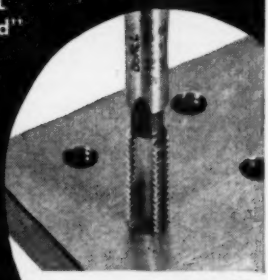
Use DoALL "Engineered" Taps

- Complete stocks
- All kinds . . . all sizes
- High speed steel
- Special taps for special needs



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The DoALL Co.

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Sensational new VIBRA-FORGE* principle assures unbreakable welds every time!

BREN-WELD

PORTABLE BAND SAW BLADE WELDER

. . . With Built-in Grinder

3/4" capacity

If you've been troubled with band saw blade breakage investigate this Bren/Weld unit built on the new Vibra-Forge principle. It gives you:

- PERFECT WELDS.
- NO BREAKAGE.
- NO FAILURES.
- WEIGHS ONLY 35 LBS.
- OPERATES ON 110 V, AC.
- UNCONDITIONALLY GUARANTEED.

LIST $169.50 PRICE

Write today for complete details

*Pat. appl'd for

Mfg'd by Brennen, Bucci & Weber, Inc., N. Y. C.

SALES DIVISION

KASSON DIE & MOTOR CORP.

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Ave., Milwaukee 11, Wis.

The spindle assemblies can be designed into any special machine where their range is suitable; drills, reamers, taps, end mills and other tools of similar size can be accommodated. Spindle sockets are furnished for either a No. 0 or No. 1 Morse taper shank, or ⅛", 3/16" or ¼" max. capacity collets. Over-all dimensions of the spindle assemblies run from 4⅝" to 8" length and from 1⅝" to 2½" dia.

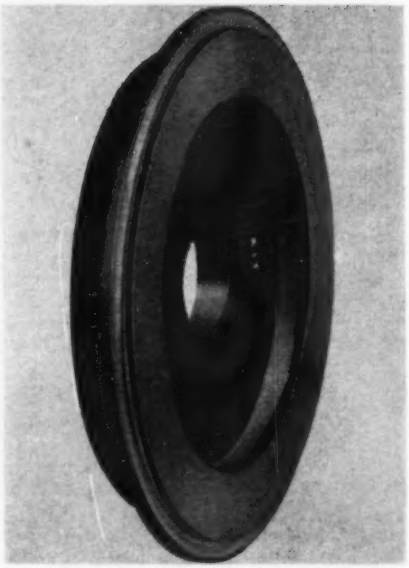
Use ACTION Card, opposite page 64, Encircle No. 33

Chip-A-Lap grinding wheels

Chip-A-Lap grinding wheels, A.I.T. Diamond Tool Co., Dept. BB, 646 W. Lake St., Chicago 6, Ill., are made with an Al-Aloid bond for wet grinding and with a resin bond for dry grinding.

When using the Al-Aloid Chip-A-Lap, plunge grinding, shaping, hogging, and radiusing can be done on one machine using only one wheel. Various types of operations can be performed by merely raising or lowering the bed. There is no down time, the manufacturer claims.

Features of resin Chip-A-Lap are: shaping and radiusing on the face section; surface grinding and chip breaking on the o.d. section.



Use ACTION Card, opposite page 64, Encircle No. 34

All-purpose Centrifugal Pump Unit No. H-2-3308A for 90% of machine tool applications

Gear Pump Unit No. SG1-4-25A Ideal for single spindle drill presses and small lathes

See how GRAYMILLS Coolant Pumps can help you

• convert to wet cutting or
• replace worn out pumps

in a matter of minutes for increased production—improved quality—and longer tool life with your present machine tools.

If you need a larger volume of coolant, cutting oils, water, solvents, etc., at low pressures, the new improved Graymills Centrifugal coolant pumps are your answer. If you need higher pressures, for heavier liquids, a Graymills Gear type pumping unit will deliver from 1 to 3 GPM with pressures up to 100 PSI. Both types will give longer, trouble-free service. efficient operation at a minimum of cost. Standard models in 1/25, ⅛, ¼ and ½ H.P. Various tank sizes and fittings.

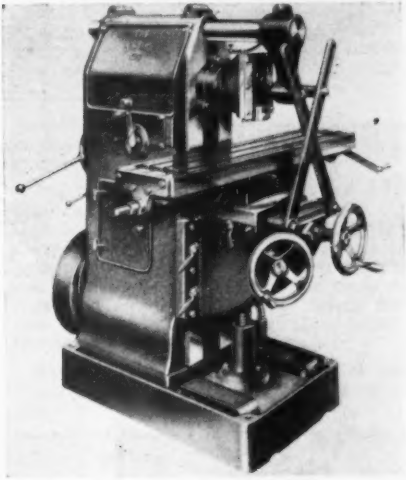
All standard models stocked by leading Industrial Supply Distributors for immediate delivery—or write for catalog.

GRAY-MILLS

GRAYMILLS CORPORATION 3721 N. LINCOLN AVE. • CHICAGO 13, ILL.
WEST COAST: 4511 MELROSE AVE., LOS ANGELES 29

Milling machine is three in one

A universal milling machine equipped to give the advantage of three separate machines in one—a motor driven slotting machine, a motor driven vertical mill and a universal mill—is being manufactured in England for the Bradley Machinery Co., Dept. B, 211 Jos. Campau, Detroit 7, Mich. Specifications: working surface of table, 46″x10″; automatic feed



longitudinal, 36½″; transverse feed, 7½″; vertical adjustment, 16″; diameter of arbor, 1″; spindle bore, Morse No. 4; diameter of overarm, 3⅜″; largest cutter that will clear, 13″; number of feed changes, 4; number of spindle speeds, 9; speeds, 13, 25, 36, 51, 71, 100, 143, 200, 400; table feed per rev., .010, .013, .021, .027; net weight, approx. 3000 lb.; floor space, 70″ x 60″; hp of motor—3 at 940 rpm.

Use ACTION Card, opposite page 64. Encircle No. 64

New model Crackerjack dresser

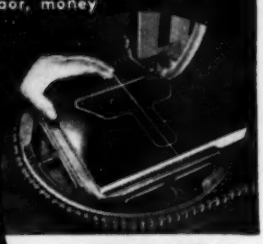
Crackerjack Jr. is the trade name for a new grinding wheel dresser using an abrasive wheel 3″ dia. x 1″ face. In dressing the grinding wheel the Crackerjack Jr. is brought in contact with the wheel at a slight angle (15°) thereby restoring the accuracy and cutting action of the grinding wheel.

The abrasive wheel of this new model Crackerjack is mounted in a heavy metal housing and is held securely by locking nuts. Hardened steel bearings are protected from dirt and abrasive. It employs

DoALL Precision Tool and Die Steel
(Ground Flat Stock)

Save time, labor, money

- Ready to use for tools, dies, gages, parts
- Parallel, square, precision ground
- Over 230 sizes
- Oil or air hardening



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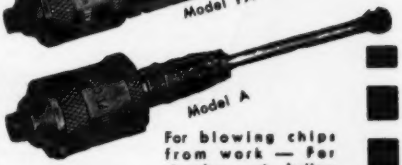
The DoALL Co.
Des Plaines, Ill.

Ink it!
Mark it!
Saw it!

Use DoALL Steel Ink

6

Air-O-Chek
THE VALVE WITH THE INTERNAL FULCRUM LEVER



For blowing chips from work — For cleaning out bellow sets, machine recesses and tee slots— For drying parts before inspection and for many similar uses, Air-O-chek is the Air-gun.

Write for details.

AIR-WAY PUMP & EQUIPMENT CO.
1054 N. Kilbourn Ave. Chicago 51, Ill.

its own lubrication system using a wick which discharges oil while cutting wheel is in motion. Replacement abrasive wheels can be installed easily. The Desmond-Stephan Mfg. Co., Dept. B, Urbana, Ohio.

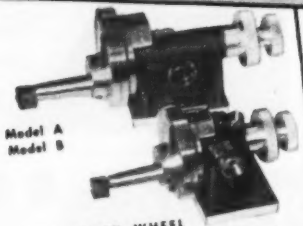
Use ACTION Card, opposite page 64. Encircle No. 65

Shears 1½" steel

A new capacity Cincinnati all steel shear, manufactured by The Cincinnati Shaper Co., Dept. B, Hopple, Garrad & Elam Sts., Cincinnati 25, Ohio, is said to cut mild steel 1½" thick by 4' long.

The shear is equipped with a front controlled power operated back gauge, having a 48" back gauge range. The back

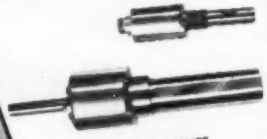
Improve Your Operating Efficiency, Quality and Profits with these LAST WORD Metal-Working Products!



Model A
Model B
Model C

LAST WORD WHEEL DRESSERS FOR RADIUS AND TANGENT ANGLE DRESSING — AVAILABLE IN 3 MODELS
MODEL A—For grinders using wheels up to 20" dia MODEL B—For small model surface grinders with 7" max wheel dia MODEL C—Compound Dresser, will compensate for compound angles involved in grinding form tools

SAMSON "Heavy-Duty" OFFSET BORING CHUCK—Has positive centering feature for drilling and milling operations. Complete accessories available



GRAY-GRIMES FLOATING DRIVER—For reaming, tapping, valve seating and similar operations. Can be supplied with standard or special shanks and adaptors.

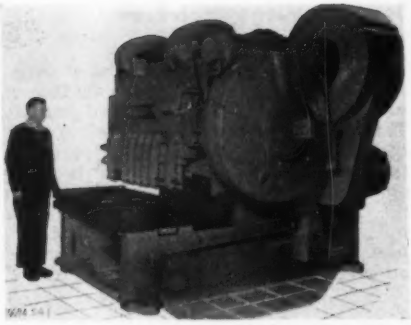
GRAY-GRIMES AUTOMATIC STEADY-REST FOR O. D GRINDING—Permits grinding complete length of shaft maintaining constant pressure against work-piece as stock is removed.

Mfg'd by Gray-Grimes Tool Co.

Send for complete data

LAST WORD sales company

18500 MT. ELLIOTT (Dept. A) • DETROIT 34, MICH.



gauge angle itself is hinged to allow the passage of plates longer than the back gauge range of the machine.

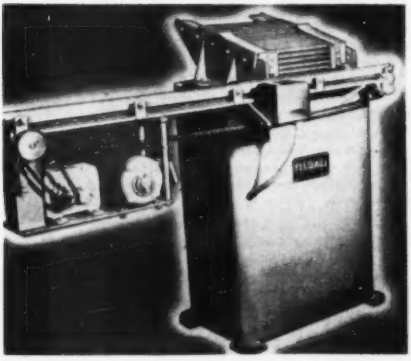
The machine is made of all steel rolled plate and has an interlocked construction. It is powered by a silent worm gear drive, has a hardened multiple jaw clutch, hydraulic holddowns, light beam shearing gauge, ball transfers in the table for easy feeding of heavy plate, safety friction to the flywheel and slitting adjustments.

Additional features are a special long scrap chute and air counterbalances on the ram.

Use ACTION Card, opposite page 64, Encircle No. 66

Automatic magazine loader for long cylindrical work

This unit automatically feeds long cylindrical work to centerless grinders, special polishing or inspection machines. Magazine is loaded with parts which are automatically delivered to built-in con-



NEW DoALL High Speed Steel SAW BANDS

Demon HIGH-SPEED STEEL

- Up to 10 times faster cutting!
- Up to 30 times longer life!
- Full safety blade

Has red heat hardness

Call DoALL

—see directory for nearest DoALL Service-Store that stocks cutting tools, gages, supplies.

or Write

The DoALL Co.

Des Plaines, Ill.

Demon Precision

Demon Buttress

¼" to 1"
2 to 10 pitch

Save your large JIG BORERS for large jobs . . . put small precision work on the LINLEY

The Linley Jig Borer provides the means . . . at very low cost . . . of handling your most exacting requirements in precision. With it you can cut costs through having a tool exactly fitted to your small work . . . save your larger machines for larger work.

SPECIFICATIONS

Table Movement: 6"x10" Table Size: 7"x17½"

Send for complete information TODAY!

LINLEY BROTHERS CO.

663 State St. Ext. Bridgeport 1, Conn.

veyor. Parts are cycled by means of a photoelectric relay mounted on conveyor attached to front of machine. Feeding rate is controlled by means of a variable speed drive on conveyors.

Entire unit is self-contained and mounted on a fabricated steel base housing electric and air controls.

Model pictured is designed for a range of work from 5/8" to 1½" dia. and 10" to 24" length. Other models are available for other diameters and lengths. Feedall Machine and Engineering Co., Dept. B, 38399 Pelton Rd., Willoughby, Ohio.

Use ACTION Card, opposite page 64. Encircle No. 67

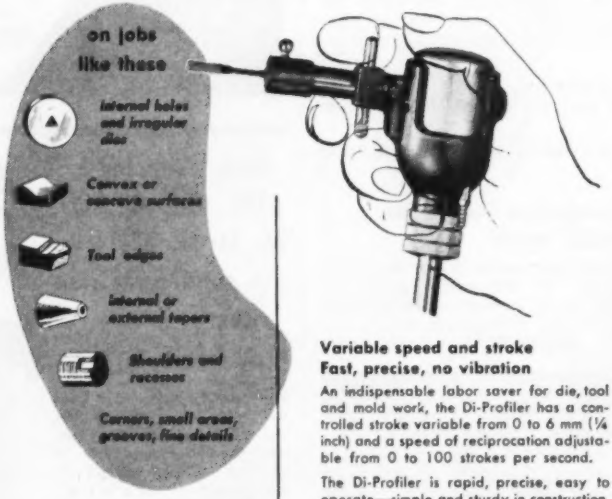
Solenoid pilot-operated air control valve

Valvair Corp., 989 Beardsley Ave., Akron 11, Ohio, has expanded its line of solenoid pilot operated control valves. The new Speed King is designed to meet the standards set by J.I.C.; all parts are totally enclosed; the junction box for electrical control is cast integral with the housing of the pilot control unit; the pilot can be mounted in two directions over the base and is universal to all assemblies; all parts are non-corrosive;

THE **Di-Profiler**

RECIPROCATING HAND MACHINE

for time-saving cutting—roughing—finishing


on jobs like these
Internal holes and irregular dies
Convex or concave surfaces
Tool edges
Internal or external tapers
Shoulders and recesses
Corners, small areas, grooves, fine details

Variable speed and stroke
Fast, precise, no vibration

An indispensable labor saver for die, tool and mold work, the Di-Profiler has a controlled stroke variable from 0 to 6 mm (¼ inch) and a speed of reciprocation adjustable from 0 to 100 strokes per second.

The Di-Profiler is rapid, precise, easy to operate—simple and sturdy in construction. Its weight of less than one pound and freedom from vibration eliminate fatigue and assure perfect control for the most intricate work.

Moderately priced, the Di-Profiler pays for itself many times through time-saving cost reductions.

Write for free demonstration or illustrated price list DB-954

Tools for every type of work
CUTTERS, FILES, DISCS, POINTS, BURRS, LAPS, SCRAPERS

ENGIS EQUIPMENT COMPANY
Sole Authorized Distributor for the United States
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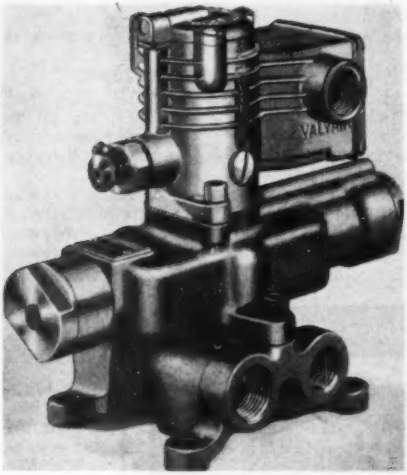


base is cast bronze; the pilot valve, a zinc base alloy casting.

The stem in the base and plunger in the solenoid are the only moving parts. Pressure range is from 35 to 200 p.s.i. for air and low pressure hydraulics; 2-, 3-, 4- and 4-way-5-port (2-pressure) models with pipe sizes from ¼" through 1". Foot or sub-base (manifold) mounting is optional in all sizes and models excepting the 4-way-5-port (2-pressure) valve. Any voltage and cycle can be accommodated.

Use ACTION Card, opposite page 64, Encircle No. 68

Aluminum alloy setup blocks protect fine machine table surfaces

New Multi-Step setup blocks made of aluminum alloy that are said to withstand great weight under clamping pressures are announced by Jergens Tool Specialty Co., Dept. B, 712 East 163rd St., Cleveland 10, Ohio.

According to the manufacturer these new setup blocks save machine setup time and protect expensive machine tables from scratches and nicks. Softer than the machine table, these new blocks actually absorb metal chips and even if dropped, absorb the nicks and scratches without injury to machine tables.

Used for setup on jig borers, boring mills, drill presses, milling machines, planers, etc., these Jergens setup blocks hold work from zero to 3" and can be

Dependable MEASURING & CHECKING EQUIPMENT

and Now

HAND WHEELS, KNOBS, HANDLES

Cadmium Plated

READY TO DELIVER

Non-rusting — good looking

SOLID ROTARY

MACHINE HANDLES

STRAIGHT and OFFSET TYPE

CAST IRON

MALLEABLE IRON

We also build jigs, fixtures, special tools and machinery. Send us your blueprints.

UNIVERSAL ANGLES

In 10 sizes, ranging from 4 x 3¾ x 5 and up.

BOX PARALLELS

In 15 sizes, ranging from 3 x 4 x 12 and up.

SLOTTED ANGLES

In 19 sizes, ranging from 4 x 9 x 5 and up.

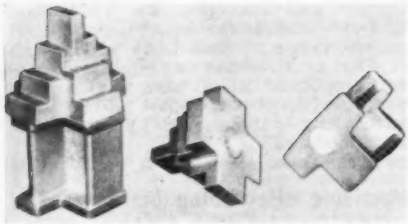
SURFACE PLATES

Over 30 sizes, ranging from 7 x 7½ to 96 x 192.

Send for Complete Catalog

MACHINE PRODUCTS CORPORATION

6771 E. McNichols Rd. Dept. A Detroit 12, Mich.



mounted on 3" high Jergens risers and thus pyramided from zero to any desired height.

Use ACTION Card, opposite page 64. Encircle No. 69

New Lufkin non-metallic tapes

Lufkin Rule Co., Dept. B, Saginaw, Mich., announces new tapes, in 25′ to 150′ lengths, made of durable woven material and coated with a special durable plastic.

These tapes are said to be especially suitable for such applications as highway construction, power and utility work, etc.

Features include: Greatest dimensional

ARROW TOOL & REAMER CO. • Established 1916

Arrow means a complete LINE OF END MILLS

THIS IS Arrow's 3 FLUTE END MILL

Manufacturing skill and tool making experience for over 37 years — adds up to preference for Arrow End Mills.

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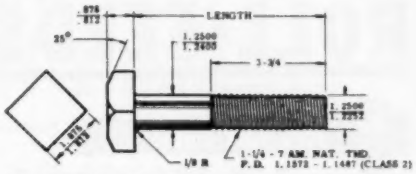
stability as the line is made of the newest and toughest fibers developed by science; tough plastic coating is abrasive-resistant and moistureproof; easy reading—graduations and bold figures are in clear contrast to the white background; first end re-enforced with long wearing plastic—green in color to indicate non-metallic; "instantaneous" readings—preceding foot number repeated each inch (or tenth of foot) in red; genuine leather case—hand stitched over rust resistant coated metal liner; plated fittings.

Use ACTION Card, opposite page 64. Encircle No. 70

Wespo high tensile strength bolster bolts

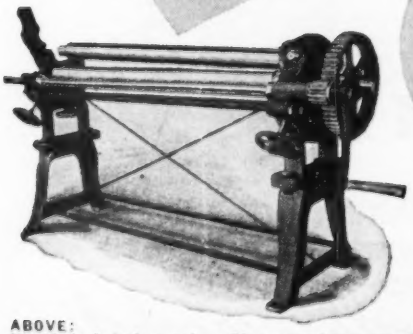
Wespo bolster bolts with a tensile strength of 149,500 psi min., are manufactured by West Point Mfg. Co., Dept. MB, 26935 W. 7 Mile Road, Detroit 19, Mich.

The manufacturer states that these bolts—made to J.I.C. press room standards—eliminate stretching, holding bolster plates more firmly to the press bed, thereby protecting expensive dies from injury due to shifting. They come in lengths from 4" to 22". Nuts and washers to fit are also available.



Use ACTION Card, opposite page 64. Encircle No. 71

Beloit SLIP ROLL HAND FORMING MACHINE



Operates to full rated capacity by hand or by power! Compact and heavy duty for years and years of hard usage. The two feed rolls, geared together, assure positive feed on even the thinnest material. The third roll is idle but can be made for gear drive at nominal cost. Completed work is easily and quickly removed. Made in bench and floor models, single and double back.

Write for complete details.

ABOVE:
No. 14 single back geared sliproll, floor model with capacity of 14 ga. 31 other models to meet every need.

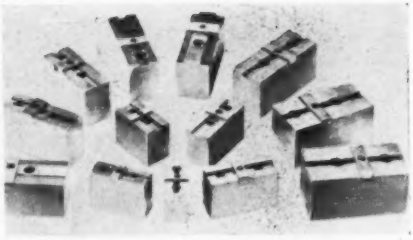
Also manufacturers of Punches, Shears, Rod Cutters, Bending and Straightening Rolls.

HENDLEY & WHITTEMORE CO.
100 Blackhawk Blvd. Beloit, Wis.

Chuck jaw blanks available in 19 standard sizes

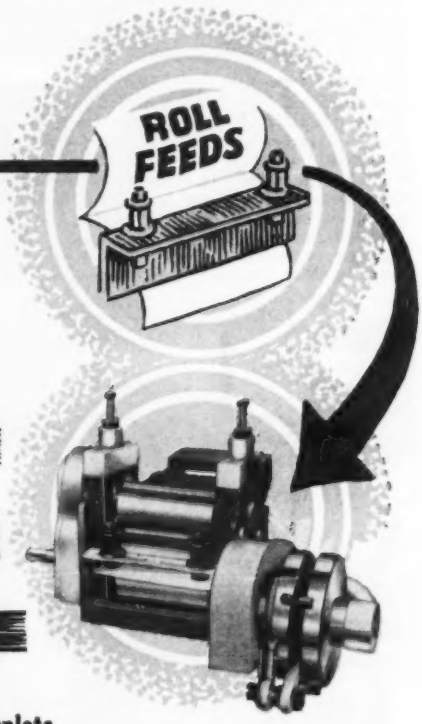
A new wide range of standard sizes of chuck jaw blanks to fit approximately 273 master chucks is announced by the manufacturer, Jergens Tool Specialty Co., Dept. B, 712 East 163rd Street, Cleveland, Ohio.

According to the manufacturer, these standard chuck jaw blanks are made of S.A.E. 1020 steel accurately machined to American Standard form. They can be used on any chuck having American



Standard master jaws including Cush-

"RFC" ROLL-FEEDS



FITS ANY PRESS
For side or rear feeding. All attachments for installing furnished, including disc and connecting linkage.

CAN'T SLIP
Each wedge has four points of contact to safeguard accuracy.

REVERSES INSTANTLY
Merely shift feed finger spring from one lug to the other.

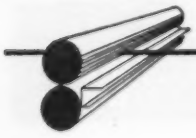
FEEDS IN THOUSANDTHS
Amazingly accurate stock movement assured.

MAINTAINS ORIGINAL SETTING
Regardless of use or wear. No ratchets or pawls to wear down and "Throw off" feed spacing.

Ready for mounting! Furnished complete.

Write today for latest Bulletin.

EARLY DELIVERY ON STANDARD MODELS



Roll-Feeds Corporation

Tel. Pawtucket 2-2200 PAWTUCKET, RHODE ISLAND

man, Skinner, Warner & Swasey and Union by simply boring out the blanks to coincide and fit to hold the parts to be machined.

Use ACTION Card, opposite page 64. Encircle No. 72

Add rubber-cushioned abrasives to line

A new series of rubber-cushioned abrasives compounded with silicon carbide has just been announced by Weldon Roberts Rubber Co., Dept. B, Newark 7, N. J.

Both the aluminum oxide and silicon carbide types of Brightboy are now being

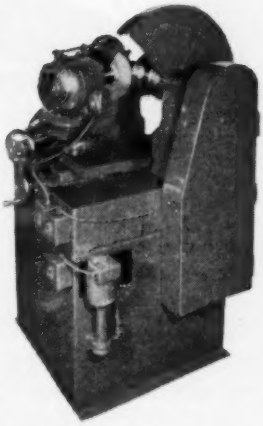
A PENNY SAVED IS
PROFIT EARNED

WITH YOUR
RUTHMAN
GUSHER
COOLANT PUMP

Low in initial cost, efficient in operation, you can depend on your Gusher Coolant Pump for *economical* operation.

1—They use less power when throttled and require no packing or priming.
2—Pre-lubricated heavy-duty ball-bearings reduce maintenance attention.
3—Electronically balanced rotating assembly cuts wear through vibration to a minimum.

For economical, efficient, long lived Coolant Pumps always specify Ruthman Gusher Coolant Pumps.



Illustrated is a CC-4S Rogers Circular Knife grinder equipped with a Gusher Coolant Pump.

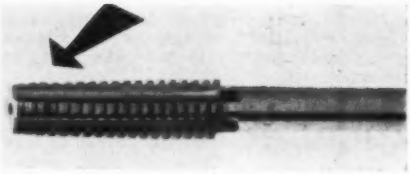
THE RUTHMAN MACHINERY CO.
1816 READING ROAD CINCINNATI OHIO

manufactured in an extensive variety of abrasive grain sizes ranging from extra coarse to extra fine. Brightboy, compounded either with silicon carbide or aluminum oxide, is made in wheels, discs, sticks, rods, cylinders, tablets and blocks for a wide range of machine and manual operations.

Use ACTION Card, opposite page 64. Encircle No. 73

Taps Acme threads in single pass

A new tap said to be capable of tapping most Acme threads in a single pass is now available from Horspool & Romine Mfg. Co., Inc., Dept. B, 5850 Marshall St., Oakland, Calif.



Secret of H&R's single-pass Acme tap is the use of relatively fine lead-screw

BRAND NEW
VERTICAL-HORIZONTAL-BASE
DE-STA-CO
TOGGLE CLAMP
507-U
with low silhouette
the fixture-hugger that makes it far easier to insert and remove work . . .
and complete clearance
of working area due to flop-over holding bar—ideal for positioning metal or plastic sheets!
Send for FREE CATALOG
on the new DE-STA-CO Models 507 and 509
DE-STA-CO DETROIT STAMPING COMPANY
World's FIRST Line of TOGGLE CLAMPS
347 Midland Avenue • Detroit 3, Michigan

threads at the starting end (indicated by arrow in photo). These threads literally pull the heavier Acme thread cutting portion of the tap through the hole, much as the starting screw on a wood bit. Use of a lead screw feed is not recommended. The design not only eliminates up to two taps and tapping operations formerly required, but also provides a more accurate, smoother thread with much less care and attention needed.

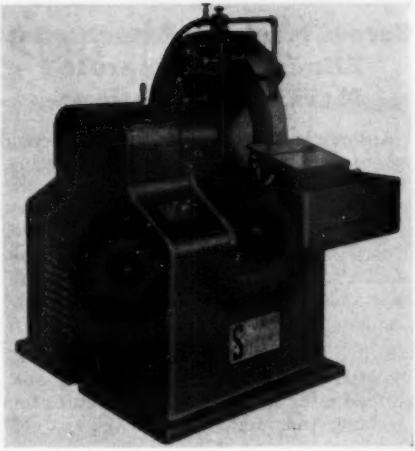
It is available for single or multiple-start Acme threads in diameters from ¾" to 2½".

Use ACTION Card, opposite page 64. Encircle No. 74

Standard starts production of 30" grinder

The Standard Electrical Tool Co., Dept. B, 2486 River Rd., Cincinnati 4, Ohio, announces production of the new 30" single wheel wet tool grinder. With a compact, well proportioned design, the new model claims vibrationless operation.

Two-speed multiple V-belt drive from 5 hp motor; safety interlock prevents overspeeding of grinding wheel; heavy grinding spindle accurately machined, ground to size; ball bearings fully protected; large size oil reservoir has visual gauge; wheel protected by structural plate steel guard, which is adjustable for wheel wear, and plate steel wheel flanges.



Use ACTION Card, opposite page 64. Encircle No. 75

BLUE VALLEY FLANGING MACHINES

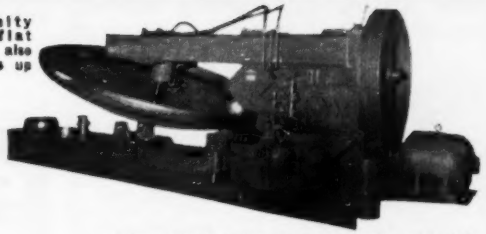
No. 1 10 gauge capacity combination circle shear and flanger; from 14" to 6' diameter flat with support; 12' diameter less support.

No. 3 ¼" capacity flanging flat heads from 18" to 12'.

No. 4 ⅜" capacity flanging flat heads 20" to 12'; also handles standard dished heads up to 12' dia.

No. 5 ½" capacity flanging flat heads 24" to 20'; also handles dished heads up to 12' dia.

No. 6 ¾" capacity for flanging flat heads 28" to 20'; also handles dished heads up to 12' dia.



Above: Machine No. 6. ¾" capacity with ½" head, 8' dia., flanged with 5¾" knuckle radius. Will flange flat, coned and dished heads in all thicknesses up to and including ¾" boiler plate on heads over 6' dia. Heating of metal not required. No head distortion. Will flange all dia. of flat heads from 28" to 20' and all dia. of dished heads from 3' to 12'.

No. 53 Elliptical Head Shear and Flanging Machine which operates from the same controls. Head is sheared to size and shape before flanging from same template without removing work from the machine.

BLUE VALLEY MACHINE & MFG. CO.
6832 Truman Road KANSAS CITY 26, MO.

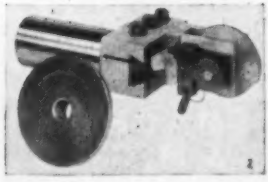
Screw Machine Attachment Eliminates Separate Marking Operations

Automatic die marking of part numbers, patent numbers, trade marks, etc., during the operating cycle of automatic and hand operated screw machines, bench and turret lathes, etc., on almost any surface of a part is possible with the complete line of automatic roll markers available from New Method Steel Stamps, Inc., 147 Joseph Campau, Detroit 7, Michigan.

Suitable for both light and heavy work, the markers are practically fool-proof and eliminate the need for separate setups for marking, thus reducing cost, scrap, etc. Quick interchangeable roll dies give remarkable versatility and reduce time for setup changeover.

Illustrated are two of the three basic models of the cost cutting markers. Model 700 (not shown) is for marking and cutting off at the same time. The marker occupies the cutoff slide, leaving other stations open for machining operations. New Method also manufactures a complete line of hand stamps, inspectors stamps, embossing dies, marking hammers, type and type holders, etc. Precision marking and engraving services available.

1. Model 500-C for automatically marking on outside cylindrical surface of screw machine parts.



2. Model 600-E for marking on the end face of parts. Normally installed in tailstock of a screw machine or similar position on other machines.

DOWEL PINS
Immediate Delivery!
Standard Size Dowel Pins from 1/8" to 1" diameter and from 3/8" to 6" length supplied in .0002 and .001 over basic sizes. Unless otherwise specified, .0002 oversize will be furnished.
Dealer's Inquiries Invited.
SCHULTZ & ANDERSON
COMPANY
111 EDISON PLACE
NEWARK 5, N.J.

Lead screw tapping head fits any drill press

A new, complete lead screw tapping head that enables unskilled help to produce precision threads on any drill press is claimed by Automatic Methods, Inc., Div. 118, 965 W. Grand St., Elizabeth, N. J.

The head features a rapidly interchangeable lead screw, a new type cone clutch reversing mechanism, and positive depth control even in blind or recessed holes. The mechanism is actuated before the tap engages the work and the lead screw guides the tap in and out of the

work. There is no load on the tap other than normal cutting load. The precision lead screw prevents thread misalignment caused by downward or upward pressure exerted by the operator. A Jacobs Rubberflex collet and nut aligns the tap which is driven positively by a floating lock assembly. The tapping head may be attached to the quill of any drill press and can be adapted for semi or fully automatic precision tapping.

Two models are available for tapping No. 0 to 5/16" and No. 10-32 to ¾" threads.

Use ACTION Card, opposite page 64, Encircle No. 35

Redesigned mist cooling unit

An improved, completely redesigned Lo-Jet Acro mist coolant system has been introduced by Air Conversion Research Corp., 4108 N. Damen, Chicago 18, Ill. More

Specify DURANT

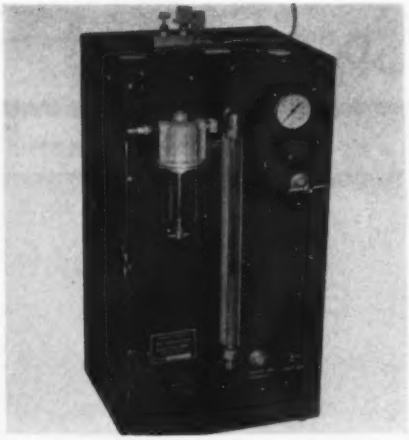
PRESS ROOM EQUIPMENT

Write Now

for new catalog showing prices and complete line of Equipment.

DURANT Tool Supply Co.

136 SOUTH WATER STREET, PROVIDENCE 3, R. I.



compact, the unit now presents a master panel control for precise and constant spray regulation. It comes complete with a pedestal for mobility, and brackets for permanent location installation. The spray mix control is mounted on the top of the unit, and is connected with flexible tubes of any specified length so that the control can be moved and installed at the desired location close to the cutting operation.

Use ACTION Card, opposite page 64, Encircle No. 36

Aro introduces smallest 3/16" air drill

A new portable air drill, said to be designed as the world's smallest and lightest weight tool for 3/16" heavy duty and ¼" light duty drilling is announced

A New Concept in Optical Comparator Design...

new WILDER small parts Comparator model C

- Vertical Design
- Erect Image
- Eye Level Screen
- Horizontal Stage

An Entirely New Model Optical Comparator Designed for 100% Production Inspection

ACCURATE - FAST INEXPENSIVE

Promotes Inspection Economy

If you manufacture mass produced parts that are now being inspected or should be inspected on an Optical Comparator, the new Small Parts Comparator will enable you to inspect them quickly, accurately and economically at a surprisingly low per-piece inspection cost.

Write for Folder—Code GINZE

Geo. SCHERR OPTICAL TOOLS, Inc. 200 MT LAFAYETTE ST. • N.Y. 12, N.Y.

by the Aro Equipment Corp., Dept. B, Bryan, Ohio.

Model 7512 weighs less than 1½ lbs., develops nearly a quarter horsepower, and is claimed to consume 38% less air. It is 5½" long, 4⅞" high, and spindle offset 41/64".

Use ACTION Card, opposite page 64, Encircle No. 37

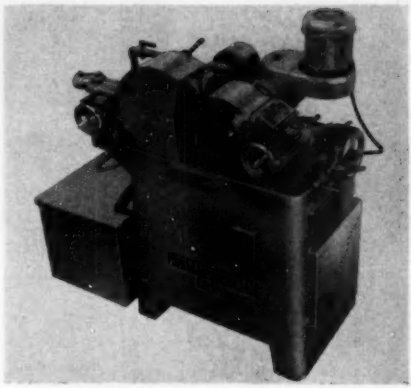
Versatile centerless grinder

A versatile centerless grinder has been announced by The American Herforder Corp., Div. of Metal Removal Co., Dept. B, 1546 N. Orleans St., Chicago 10, Ill.

This self-integrated unit can operate as a through-feed, in-feed, crushed form or template diamond dressed form grinding machine. In-feed grinding adapts the machine for producing formed, tapered, or concentric multiple diameter work.

Although this grinder is said to be simple enough for unskilled workers to operate, it is so accurate it can hold 0.0001".

Work capacity is from 1/16" to ⅝" dia. on steel and up to 1" dia. on non-ferrous, ceramics, carbon, glass, cork, rubber, plastics and other low tensile material. The 12 x 2½ x 5" grinding wheel is driven by a 3 hp motor and the 7" feed wheel



by a separate ½ hp geared motor with speeds of 21, 42 and 320 rpm. Both the grinding wheel and feed wheel spindles run in adjustable taper roller bearings.

Use ACTION Card, opposite page 64, Encircle No. 38

Sine plates

Two new sine plates, a 5" and 10" size, have been introduced by the Bald Eagle

IF...

Magnets can solve your tooling problems

THEN

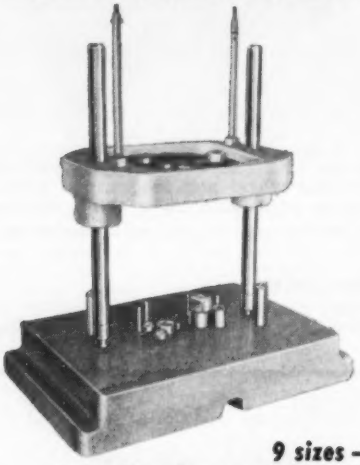
A Cerro Alloy can solve the problem of fastening magnets WITHOUT PRESS FITS, SET SCREWS, ETC. Many hours can be saved by locating and anchoring magnets with Cerro-tru, expanding low fusing metal.

Write today for Pamphlet A1 and receive many time-saving ideas for fastening non-moving parts *without machining.*

CERRO DE PASCO CORPORATION

Dept. 7, 40 Wall Street, New York 5, N. Y.

Zagar Self-clamping
DRILL JIGS
NOW STANDARDIZED for
DRILLING, REAMING, TAPPING



9 sizes —
5 combinations per size — for
hole patterns 3" through 15" dia.

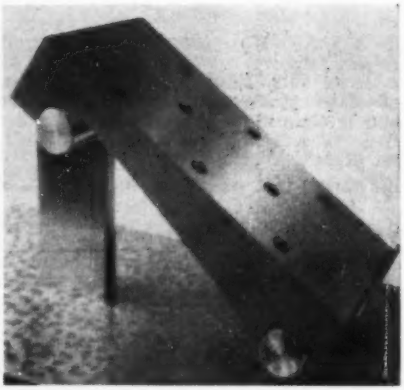
Standardization makes for quick delivery and attractive price. Only a few minor parts need be made. Speed up machining operations. The operator merely feeds the parts — the Zagar Self-clamping Drill Jig does the rest. Zagar drill jigs are now "off the shelf".

♦ ♦ ♦

Write for Bulletin B-9.

ZAGAR TOOL, Inc., 24000 Lakeland Blvd.
Cleveland 23, O.

Zagar TOOLS For INDUSTRY and SPECIAL MACHINERY



Tool Co., Newton Building, Dept. B, St. Paul 1, Minn.

The bodies are double normalized and precision ground. Tapped holes are conveniently placed on the working surfaces to provide a positive method of clamping work to the sine plate. Accuracy is guaranteed to be within ± .0002" on both sizes. The hardened rolls are ground to within .0001" of size and their seats are hand scraped to assure accurate fit.

Use ACTION Card, opposite page 64. Encircle No. 39

Polygon tool box produces parts in one operation

The Chatwin polygon tool box was developed in 1944 for the purpose of turning hexagonal, octagonal, square, or any irregular shapes within its capacity, quickly and free from fraze and burrs, thereby eliminating the necessity for subsequent milling operations.

Since that time, boxes have been developed to suit most types of capstan, turret and automatic lathes, and other developments include the production of internal and external taper and the boring of polygon shaped holes to afford perfect mating to external shapes produced on the same box.

The box comprises a holder for a tool which can slide transversely under the control of a rotary cam that is journalled in the body of the box. On capstan and turret lathes, the cam is driven by the lathe spindle and its shape corresponds with the square, hexagon or other form to be turned on the work; on multi-spindle automatics the cam is driven from

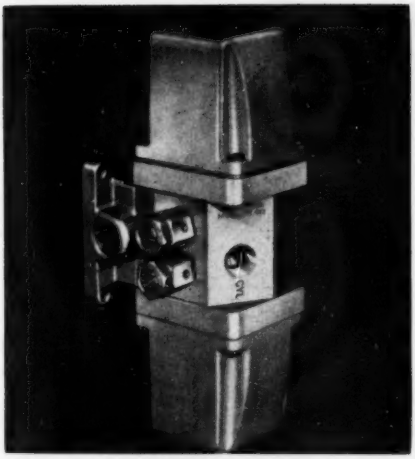
the rear by means of a coupling or shaft connected to the rear gear box.

The swivel type polygon tool box has been designed to meet the need for one which will form shapes behind shoulders. Bradley Machinery Co., Dept. BB, 211 Jos. Campau, Detroit 7, Mich.

Use ACTION Card, opposite page 64, Encircle No. 40

Hi-Cyclic solenoid air and hydraulic valves

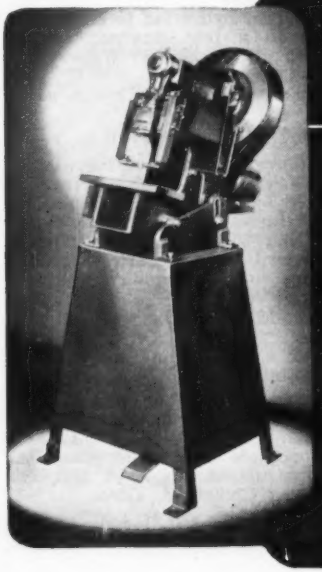
The Beckett-Harcum Co., Dept. B, 1087 Wayne Rd., Wilmington, Ohio, is now manufacturing an improved design of their Hi-Cyclic single and double solenoid air and hydraulic valves. The design improvements embody the latest developments in industrial-type, heavy duty solenoids; nylon end thrust bushings for positive valve piston location; elimination of tedious solenoid adjustment; dust and moisture-proof solenoid enclosure; quick disconnect electrical connections which permit removal of the solenoid coil without disturbing the electrical circuit; valve part interchangeability, enabling rapid changeover from one valve model to another in the field. There is no metal-to-metal contact between the solenoid and valve piston. Nylon end thrust bushings, nylon actuating pins and Hycar bumper mountings prevent shock.



Use ACTION Card, opposite page 64, Encircle No. 41

Boyar-Schultz 6 x 12 surface grinder

The Boyar-Schultz 6x12 surface grinder is now available with hydraulic longi-



WHITNEY METAL
TOOL COMPANY
42 YEARS EXPERIENCE

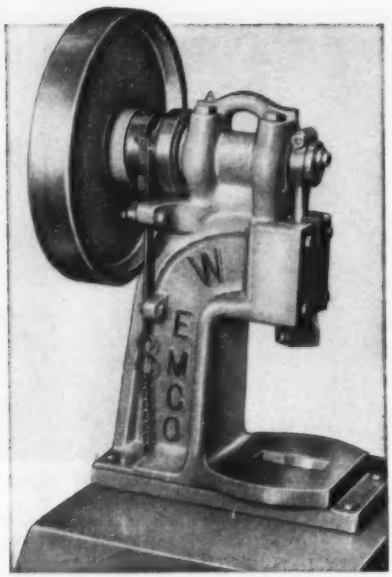
WHITNEY-JENSEN
No. 127
INCLINABLE POWER PUNCH PRESS

Small, powerful inclinable punch press that can be tilted to a maximum of 25°. Flywheel at rear permits easier feeding of stock; also provides greater margin of safety. Rated at 275 strokes per minute; length of stroke is 1"; capacity 5 tons. Has non-repeat clutch.

Throat Depth — 6" Throat Height — 7"
Floor Space — 29" x 22"

Send for Catalog

WHITNEY METAL TOOL COMPANY
115 FORBES STREET, ROCKFORD, ILL.



EMCO "W", bench type, 5-ton; also larger EMCO "X", 10-ton. Both sizes also stand-mounted. With or without motor drive.

EMCO POWER PUNCH PRESSES are SPEEDY and SAFE

Versatile EMCO presses excel for punching, forming, stenciling and riveting metal, leather, plastics and other non-metallic materials. Up to 300 operations per minute. "Big machine" speed, strength, rigidity, accuracy, endurance. Compact, fool-proof; simple design — easy to operate. Thousands of EMCOS in money-making use testify to Klaas' dependability since 1921.

Ask for our Bulletin "B-9"

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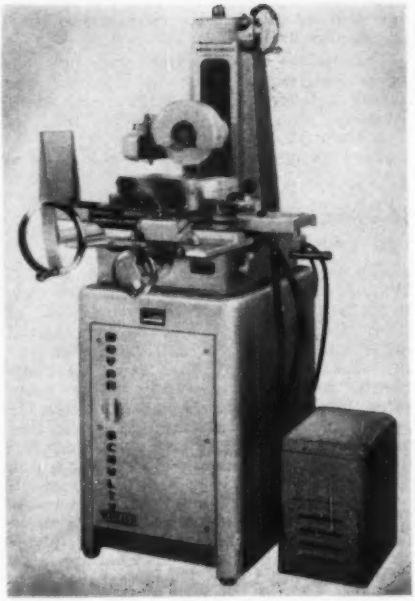
THE KLAAS MACHINE & MFG. CO.
4346 East 49th St.
Cleveland 25, Ohio

KLAAS-BUILT



tudinal action. A new hydraulic valve, designed and developed by Boyar-Schultz engineers, is said to afford perfect reciprocating movement. The machine can be changed from hydraulic to hand feed and return in a few seconds. Boyar-Schultz Corp., Dept. B, 2110 Walnut St., Chicago 12, Ill.

Use ACTION Card, opposite page 64. Encircle No. 42

Micro-Height gage improved

Further improvements have been made on the new height gage which was recently introduced by the Fairfield Gage Co., including: A tarnish and rust-proof satin chrome finish; a 3" hardened, ground and lapped standard riser is now available for attaching to the gage—with direct capacities from zero at base to 3", in thousandths, the addition of the riser extends the range to 6"; reads like a micrometer; supplied with a scriber for use by layout men and toolmakers.

By replacing the scriber with a dial indicator, it can be used to measure distances between holes or surfaces and make fast and accurate inspection possible. Cleveland Instrument Co., Dept. MB, 735 Carnegie Ave., Cleveland, Ohio.

Use ACTION Card, opposite page 64. Encircle No. 43

Continued on page 343

AVAILABLE LITERATURE

FREE CATALOGS AND BULLETINS AVAILABLE FROM MANUFACTURERS

For copies of the literature in which you have an interest use the postage-paid postcard on the next page. Merely circle the identifying numbers and mail the postcard.

1. "Cutting Oil Bases," a booklet just released by D. A. Stuart Oil Co., Ltd., 2749 S. Troy St., Chicago 23, Ill., details four principal oil bases prescribed for tapping, threading, broaching, gear hobbing, automatic screw machine and turret lathe work on a wide variety of metals. Attention is given to varied metal cutting conditions—speeds, feeds, machinability—pertinent in selection and use of cutting oil bases.

2. Milling Machine, Engineered Production Service. A new circular on the Sundstrand Model 66 Rigidmil illustrates some typical uses of the machine, and includes features, machine cycles, and specifications. Also available is a 32-page brochure, "Sundstrand Engineered Production Service," which contains 20 examples of this service for small lot, long run and special high production work. Sundstrand Machine Tool Co., Dept. B, Rockford, Ill.

3. Honing Machines. A booklet containing typical applications from plants that have used Sunnen honing machines in production, tool room, maintenance, and salvage is obtainable upon request from Sunnen Products Co., 7938 Manchester Ave., St. Louis 17, Mo. Machines are used mostly for metalworking applications, in sizing and finishing internal diameters, but they are equally useful for work in plastics, ceramics, and glass.

4. Tapping Attachments. Leaflet issued by Tapmatic Corp., Dept. MTB, 845 W. 16th St., Costa Mesa, Calif., describes the Tapmatic, for non-reversible spindles, and the Tapmaster, for reversible spindle machines. Lifetime, adjustable, spring-loaded ball-type clutch, ball drive self-reversing feature, free axial floating action are claimed.

5. "Mechanical Controls, Linkages and Mechanisms," a brochure being distributed by Teleflex Inc., Dept. Y-BB, 125 S. Main St., North Wales, Pa., describes a unique mechanical system incorporating a rack-like flexible cable within a smooth rigid conduit. System accurately transfers linear or rotary motion over a devious path without intermediate links or pulleys. Ask for Bulletin 500.

6. Surface Grinders. Thompson Type C hydraulic surface grinders are described in detail in new catalog (C53) from the Thompson Grinder Co., Dept. MB, Springfield, Ohio. Features claimed are: cross feeding wheel head with horizontal spindle grinding with the periphery of a 20" dia. wheel; rapid and accurate positioning of the wheel to the work; in position wheel truing; simplified controls. Also available is Catalog F53 presenting the Thompson Type F surface grinder.

7. Abrasive and Friction Saw. The Ty-Sa-Man 111-D abrasive and friction saw for grating and structural steel is subject of Folder No. 1174, being distributed by Machinery Sales Co., Dept. BB, 1923 Forbes St., Pittsburgh 19, Pa. Saw is mounted to traverse on a rigid rail. All controls are grouped in the operating head where operator can watch work

and control all operation. Also available is Sheet 1195, covering special purpose sawing machines.

8. Skilled Labor. A publication entitled "The Skilled Labor Force," released by the Dept. of Labor, contains information concerning the skilled labor force—how many craftsmen in each trade, are they growing in number, how old are they, what income do they get, in what industries are they employed, etc. Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Price 45 cents.

9. Hack-Saw Blades. Printed copies of "Simplified Practice Recommendation R90-53, Hack-Saw Blades" are now available from the Superintendent of Documents, Government Printing Office, Washington 25, D.C. Price 5 cents each. The recommendation, originally issued in 1928, established a simplified list of stock sizes of hack-saw blades. This is the fifth revision; 18 sizes of power hack-saw blades have been eliminated from the fourth edition, and 8 sizes added.

10. Turret Lathes. New design features built into the Warner & Swasey turret lathes are described in booklet being distributed by the company. A new simplified headstock furnishes additional speeds that can be changed automatically. The Warner & Swasey Co., Dept. MB, 5701 Carnegie Ave., Cleveland 3, Ohio.

11. Gage Blocks. Croblox (chrome carbide) gage blocks of the Webber Gage Co., Dept. BB, 12912 Triskett Rd., Cleveland 11, Ohio, are catalogued and illustrated in new bulletin. Croblox differs from Carblox in that it is similar to steel in its coefficient of expansion and has better resistance to corrosion than conventional carbide.

12. Whirl-Dex, a complete tool consolidating many practices and methods now used for grinding various tools, has a keyed adjustable 90° square locator, through which square blocks with diameters extending from its face can be accurately positioned and ground without the use of centers. Tool is useful in checking many types of gages requiring accurate indexing. Literature available from the Whirl-Dex Co., Dept. B, 14847 Heyden, Detroit 23, Mich.

13. Automatics, Threading Machines. Well-designed bulletin, No. NA-1, the National Acme Co., Dept. BB, Cleveland 8, Ohio, describes the products and services of the company. The booklet is divided into four sections, each covering a particular division of National Acme: machinery division, threading tools division, electrical specialties division, contract mfg. division.

14. Chucks. Whiton geared scroll and independent hardened plate type chucks are presented in a colorful brochure issued by the Whiton Machine Co., Dept. MTB, New London, Conn. Jaw slots are formed by separate, hardened and ground segmental plates which are subsequently mounted on the chuck body.

15. Vises, Clamps, Positioning Devices. General Catalog No. 110, Wilton Tool Mfg. Co., Dept. CR-B, 941 Wrightwood Ave., Chicago 14, Ill., describes the various types of vises, clamps and positioning devices produced by Wilton. Catalog contains cross-sectional drawings showing internal construction of products.

16. Drill Head. A comprehensive analysis of their Quick Change adjustable multiple drill head is presented in latest bulletin of the Wisconsin Drill Head Co., being distributed by F. L. Haggard, Dept. BB, 16196 Northlawn Ave., Detroit 21, Mich. Head is entirely gear driven. Standard models available with two to eight spindles.

17. Production Feeding Equipment. The Wittek Mfg. Co., Dept. MTB, 4305 W. 24th Pl., Chicago 23, Ill., has issued a condensed bulletin illustrating and describing its production feeding equipment for punch presses. The use and application of automatic roll feeds, stock straighteners, and reel stands are covered.

18. Limit Switch. A 4-page bulletin, LS54A, has been published covering a new heavy duty limit switch, said to feature a trigger type mechanism and the bounce characteristics of a light duty switch combined with the vibration resistance of a heavy duty switch. Write Dept. LBB, the R. B. Denison Mfg. Co., 102 St. Clair Ave., N.W., Cleveland 13, Ohio.

19. Diamond Products. Catalog No. 102, the United Diamond Tool Corp., Dept. BB, 51 Prospect Ave., Lynbrook, N.Y., presents the most recent information on diamond tools and diamond wheels manufactured by the company. Covered are: diamond wheel dressers, forming and radius tools, special tools, thread grinders, diamond abrasive compounds, diamond wheels.

20. Dial Gages. Bulletin 454, Boice Mfg. Co., Inc., Dept. MB, Staatsburg, N.Y., describes large diameter gages, length gages, and adjustable setmasters. Adjustable dial indicator comparators are designed to eliminate the necessity of replacing gaging equipment when dimensional changes are made during production.

21. Universal Cutter and Reamer Grinders for grinding clearances on cutters and reamers, straight or spiral flute, shank or arbor type, cemented carbide or high speed steel are discussed in bulletin issued by the Union Twist Drill Co., Dept. B, Athol, Mass.

22. Light-Heavyweight Machine Tools. A new catalog and price list for the Walker-Turner Div., Kearney and Trecker Corp., Plainfield, N.J., covers their line of drill presses, radial drills, spindle shapers, flexible shaft machines, jointers, tilting arbor saws, jig saws, belt and disc surfacers, radial saws, and lathes.

23. Tractor Service Jack. The Rodgers Portable tractor service jack, Rodgers Hydraulic Inc., Dept. B, Minneapolis 16, Minn., is a maintenance tool for work on shovels, cranes, trenchers, crushing and screening plants and other heavy construction equipment. Develops 100 tons pressure for pressing, jacking, straightening, assembling, and has a maximum pull-back pressure of 80 tons. Brochure available upon request.

24. Radial Drills and Mills. Masters Machinery Supply Co., Dept. MB, 3613 Archer Ave., Chicago, Ill., has available a 40-page catalog published by the Arboga Maskiner Co., of Sweden, showing direct gear drive machines up to a 40" radial that claim faster speed changes, unusual rigidity, and other new features.

25. Chip Separators. Two leaflets available from the McKenzie Engineering Co., Dept. MB, Newtown, Conn., describe the company's screw machine chip separators, both floor and bench models. Separates screw machine production from chips; separates parts of steel, brass, aluminum; separates a maximum of 5000 parts from chips in one minute.

26. Patterns. Mummert-Dixon Co., Dept. BB, Hanover, Pa., claims to be equipped to handle both small and large patterns, and both simple and complicated core jobs. Flyer describes this part of their work.

27. Hydraulic Attachment for Iron Bender. The Hossfeld hydraulic attachment, Hossfeld Mfg. Co., 400 W. Third St., Winona, Minn., can easily be added to any size No. 2 Hossfeld universal pipe, bar and angle iron bender. The unit provides plenty of power for bending of heavy stock such as 2" x 2" x 3/16" angle iron or 2" pipe. Primarily intended as a labor-saving device. Write for illustrated leaflet.

28. Gages. Pressure gages manufactured by the Heise Bourdon Tube Co., Inc., Brook Rd., Newtown, Conn., feature: precise reading through full 270° dial capacity; custom built in ranges from 15 p.s.i. to 20,000 p.s.i.; accuracy to one part in 500; flush or wall mounting; individually engraved graduations to specifications; balanced gage pointer; external adjustment of dial zero.

29. Vertical Milling Machine. Design of the universal head of the vertical miller made by Duff Machine Co., Dept. B, 31 Wingate St., Haverhill, Mass., permits easy positioning of spindle at any angle. The overarm is set in a keyway to allow forward and backward adjustment without changing the accuracy. Booklet available upon request.

30. Dividing Heads. Catalog No. 16, the Carroll Dividing Head Co., Dept. BB, 3525 Cardiff Ave., Oakley, Cincinnati 9, Ohio, illustrates and describes the company's line of dividing heads. Specifications and prices are included. Right or left hand models.

31. Machine Tools and engineering equipment made in England and distributed by Bentley Industrial Corp., Dept. MB, 41 E. 42nd St., New York 17, N.Y., are featured in brochure issued by the distributor. Some of the products covered are milling machines, shaping machines, drilling machines, lathes, surface grinders.

32. Facing and Counterboring Tools, special production tools are thoroughly described in illustrated catalog, No. 54, from Genesee Mfg. Co., 562 Hollenbeck St., Rochester 21, N.Y. In four sections: (1) adjustable hollow mills for cutting steel; (2) adjustable hollow mills for cutting cast iron and nonferrous metals; (3) facing and counterboring tools; (4) special production tools.

33. "Cerro Alloys in the Pattern Shop" is a booklet published by Cerro De Pasco Corp., Dept. A, 40 Wall St., New York 5,

THIS HELPFUL LITERATURE NOW AVAILABLE

N.Y. It describes Cerrobase, an alloy of 55.5% bismuth and 44.5% lead, used to make duplicates of the original master pattern. Features claimed: non-shrinking, casts well in various materials, good for duplication of thin sections, low melting and pouring temperatures.

34. **"Machine Shop Equipment and Supplies"** has been issued by Grand Tool & Supply Co., M6MD Grand St., New York 13, N.Y. Some of the products included are surface plates, angle plates, milling machine arbors, arbor spacers, running bushings, arbor spacer shims, shell end mill arbors, adapters, precision live centers.

35. **Diamond Wheels.** Action Diamond Tool Co., Dept. BB, 4545 W. Grand Ave., Chicago 39, Ill., has issued a 44-page catalog describing its complete line of Jetaline and RoBot Resin diamond wheels. The former used with a coolant will cut in carbides depths up to ⅛" in a single pass. The RoBot Resin has a new bond that is said to have longer life. Use a factory letterhead.

36. **Pneumatic Equipment.** The comprehensive catalog issued by Air Control Inc., Dept. MB, 519 Milwaukee Ave., Chicago 22, Ill., includes information on compressors, pressure tanks, water separators, air cylinders, aftercoolers, air presses, air valves, electric valves, air vises, etc.

37. **Welding Aluminum.** The latest developments in aluminum welding are described by Aluminum Co. of America, Dept. B, 1501 Alcoa Bldg., Pittsburgh 19, Pa., in the 176-page book, "Welding Alcoa Aluminum." Photographs and drawings are coupled with the comprehensive text to illustrate all the practical methods for welding this metal: torch welding, arc welding, resistance welding, and pressure welding.

38. **Service Awards.** A 16-page booklet, "Industry's Medals of Honor," a manual of better employee relations through tested service award programs, has recently been published by the American Emblem Co., Dept. BB, Utica, N.Y. Describes methods of setting up a service award program, choosing the design, and a variety of presentation methods.

39. **Sheet Weight Calculator.** A handy new sheet weight calculator is being offered to sheet metal fabricators by Armco Steel Corp., Dept. MTB, Middletown, Ohio. Weights can be determined quickly for many types of special and commodity steel sheets, including coated and uncoated grades, as well as stainless steel sheets and plates and nonferrous metals. Price 50 cents.

40. **Flute Grinders.** Issuance of a new eight-page bulletin on flute grinding has been announced by Edward Blake Co., 440 Cherry St., West Newton 65, Mass. The company's standard machine will handle right and left hand taps from smallest to 5/8" dia. with 2, 3, or 4 flutes. Large capacity workhead is available for handling 4-flute right hand taps having shank dia. up to 1⅜", or body dia. up to 2".

41. **Maintenance Manual.** "How to Economically and Efficiently Maintain Carboloy Mining Tools," Maintenance Manual CM-121, is available from Carboloy Dept. of General Electric Co., Dept. BB, Detroit 32, Mich. Material has been prepared by qualified mining engineers who are familiar with mining tool maintenance problems and understand the need for obtaining the highest tonnage at the lowest tool cost per ton.

42. **Surface Broaching.** The new Cincinnati duplex vertical Hydro-Broach machine catalog, No. M-1848, is larger and more profusely illustrated than the company's previous catalogs. Basic considerations for good surface broaching application are listed. Then follow highlights of the Hydro-Broach design, applications, and specifications. The Cincinnati Milling Machine Co., Dept. B, Cincinnati 9, Ohio.

43. **Overhead Materials Handling Equipment.** "Engineering and Application Data," booklet of Cleveland Tramrail Div., The Cleveland Crane & Engineering Co., 5420 E. 281st St., Wickliffe, Ohio, has been revised to include latest information covering overhead materials handling equipment. Booklet features track drives, cranes, electrification, buckets, grabs, etc.

44. **Drill Bushings.** Features claimed for drill bushings made by the Ace Drill Bushing Co., Inc., include: every bushing

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plainly marked for size; full polished radius saves drills; concentricity .0003 maximum on all standard parts; high grade steels specially treated for uniform 62-64 R.C. hardness; chamfer permits easy entry. Write for illustrated folder.

45. Broaching Machines. Available now for distribution is a four-page bulletin (RU-54) describing the entire line of pull-up broaching machines offered by the Colonial Broach Co., Dept. BB, P.O. Box 37, Harper Station, Detroit 13, Mich. Contains blue print, dimension chart, specs. table, and brief but thorough text material.

46. Presses, Engineering Equipment, Hydraulic Oils. Three booklets have been issued by the Denison Engineering Co., Dept. B, Columbus 16, Ohio. Press catalog, No. 153, contains illustrations of the Multipress performing blanking and forming, riveting, coining, drawing, crimping and swaging operations. Bulletin 143-A describes flow controls, pressure controls, and check valves. Catalog 45 presents facts about hydraulic oils for Denison equipment.

47. Presses. Dreis & Krump Mfg. Co., Dept. BB, 7400 S. Loomis Blvd., Chicago 36, Ill., has issued a four-page circular illustrating and describing Chicago SS presses, having capacity of 30 to 400 tons and large die area.

48. "Protecting the Public Health" is a brochure issued by E. I. Du Pont De Nemours & Co., Dept. MTB, Wilmington, Del. It pictures how the company fulfills its responsibilities toward public health and protection as our society becomes more complex. This is the story of research that takes the perils out of modern miracle products.

49. Electrical Discharge Grinding, Machining. Three bulletins have been prepared by the engineering staff of the Elox Corp. of Mich., Dept. BB, 740 N. Rochester Rd., Clawson, Mich. Bulletin No. 5 discusses the Elox process of electrical discharge grinding. No. 6 tells of wheel erosion and dressing in electrical discharge grinding. Bulletin No. 7 reports on electrodes used with the Elox process of electrical discharge machining.

50. Lubricants. Three leaflets issued by Fiske Bros. Refining Co., Dept. B, 129 Lockwood St., Newark 5, N.J., describe, respectively, Magic soluble oil, for milling, grinding, turning, etc.; quenching oils for uniform hardening at a lower cost per ton; wire drawing lubricants, water soluble compounds for fine wire drawing operations.

51. Tool Holder. Folder describing the Elk universal precision tool holder manu-

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factured by Elk Tools, Inc., New York, N.Y., is now available. Said to perform the work of 10 single purpose toolholders. Once holder is set up, the bit can be removed for regrinding and replaced without resetting the holder in the toolpost.

52. Anti-Friction Compound. Motor-Mica, manufactured by Scientific Lubricants Co., Dept. MTB, 3469 N. Clark St., Chicago 13, Ill., helps solve lubricating problems by adding a protective silvery coating that prevents metal-to-metal contact. Reduces friction and heat to a minimum. Literature will be sent upon request.

53. Test Indicator. The Koch test indicator, distributed by Andrew Genales, Dept. B, 28 Second Ave., Nyack, N.Y., is featured in a folder from the company. Indicator has two working ends, one to test outside surfaces, the other inside. Has a torsion spring as well as a compression spring. Each graduation represents 1/1000" movement of the plunger.

54. Twist Drills. The Hi-Duty Drill Works, Dept. BB, Fleetwood, Pa., have released an illustrated folder listing the types of drills they manufacture, descriptions, and the purpose for which each type is intended. A price list is also available.

55. Push-Type Cranes. The Industrial Crane & Hoist Corp., Dept. B, 315 N. Ada, Chicago, Ill., has issued Bulletin PT-1253 presenting push-type cranes. Types described are the underhung push-type cranes, light duty; underhung push-type, heavy duty; top running push-type, heavy duty.

56. Thread Gages. Three booklets being offered by Johnson Gage Co., Dept. MTB, Bloomfield, Conn., describe and illustrate the company's Ring-Snap thread gages and thread comparators and analyzers. Ask for Forms B-A53, J-B53, and BC-H52.

57. Forming and Bending Aluminum. Practical procedures and technical advancements in forming and bending aluminum are presented in a comprehensive 272-page book prepared and published by the technical writing department of Kaiser Aluminum & Chemical Sales, Inc., c/o Mike Adle, Dept. BB, 919 N. Michigan, Chicago, Ill. May be obtained free of charge when requested on company letterhead, or at a cost of $2 for personal libraries.

58. Friction Saws. Two bulletins have been issued by Kling Bros. Engineering Works, Dept. B, 1320 N. Kostner Ave., Chicago, Ill., on their high speed friction saws. Bulletin 4200 illustrates the latest developments on the horizontal stroke saw. Bulletin 9200 features downstroke and horizontal stroke saws in a wide range of models and sizes.

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MACHINE and TOOL BLUE BOOK SEPTEMBER, 1954

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52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68
69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85

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10,000 IN USE Accepted by all leading manufacturers as the speediest, most versatile portable engraver. Only the NEW HERMES has these patented features:

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- Automatic depth regulator.
- Self-centering holding vise.
- Adjustable copy holders.

Send for Catalog No. IM-28, describing full line of Engraving Machines including HEAVY DUTY BENCH TYPE MODEL (200 lbs.)

NEW HERMES ENGRAVING MACHINE CORP.

13-19 University Pl.. New York 3, N. Y.

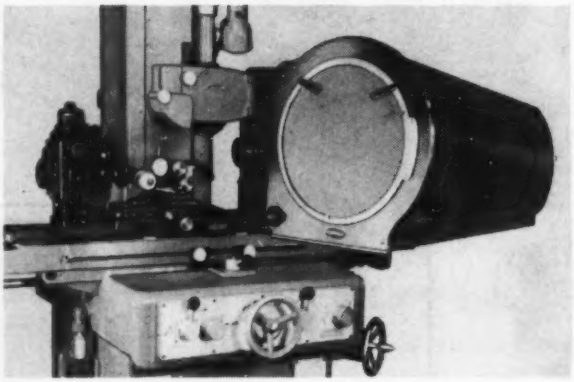
59. Stock Cylinders. A compact, comprehensive price list covering its complete line of stock cylinders is available from Miller Fluid Power Co., Dept. BB, 2040 N. Hawthorne Ave., Melrose Park, Ill. Included are air cylinders from 2″ through 8″ bores, hydraulic cylinders from 1½″ through 4″ bores, both cushioned and noncushioned types. Strokes range from 2″ through 13″.

60. Centerless Grinders. A new bulletin describing their two models of precision centerless grinders has been issued by Landis Tool Co., Dept. MB, Waynesboro, Pa. They may be used for thrufeed or infeed grinding of large or small quantities. Bulletin gives special operating features, lists standard equipment and specifications.

61. Engine-Driven Welders. The Lincoln Electric Co., Dept. BB, Cleveland 17, Ohio, is distributing a perforated leaflet featuring the Lincoln Shield-Arc engine-driven welders. Dual continuous control is said to provide both the right type arc and right arc intensity. Welding can be done in any position: flat, overhead, or vertical.

the new PORTMAN

...Dual Purpose OPTICAL PROJECTOR



...is GRINDER MOUNTED

or for "Bench" Use

This new instrument is easily attached to a surface grinder for simultaneous finish-grinding *and* inspection . . . for *uninterrupted production* of flat and circular form tools.

Accuracy of configuration may be checked constantly and without loss of time. It can also be used on the "bench" as a regular Precision Optical Projector.

FEATURES: Dual purpose . . . grinder-mounted or for bench use; Higher production; Greater convenience; Lower costs (lower first investment and continual production savings!).

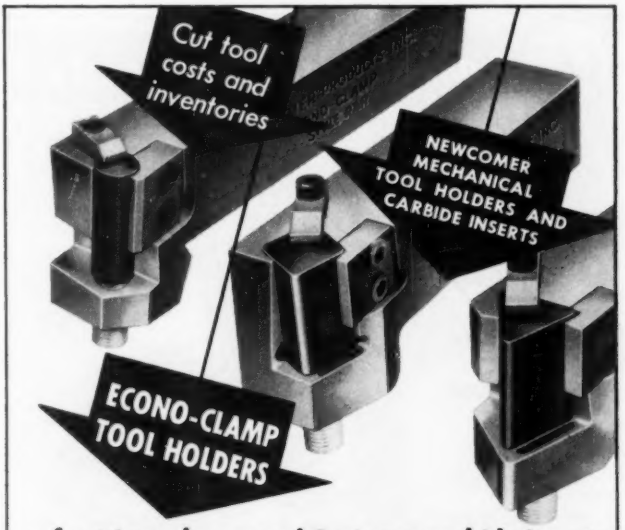
PORTMAN
INSTRUMENT CO., INC.
Town Dock Rd. • New Rochelle, N. Y.

Booklet OFG-200 sent free on request.

62. "Tools of Our Times" is available from Marshall Tool & Supply Corp., Dept. MTB, Los Angeles, Calif. The book is a comprehensive tool and machine directory compiled in five cross-referenced sections. It offers information on thousands of items. Over 800 manufacturers are represented. Price $5.00.

63. Rotary Tools and Grinders. A 38-page booklet cataloging the products of the Metal Removal Co., Dept. MB, 1546 N. Orleans St., Chicago 10, Ill., has recently been issued. Grinding wheels, abrasive specialties, carbide burrs, end mills are presented. Photographs illustrate items in use.

64. Deburring-Chamfering Machine. Two-page bulletin just released by Modern Industrial Engineering Co., Dept. B, 14230 Birwood Ave., Detroit 38, Mich., describes features of the new Burr-Master Model BMI-14 universal internal spline and gear deburring-chamfering machine. When shifting production from one spline or gear to another, only four components need be changed, minimizing down-time on the gear finishing line.



...for triangular, round & square carbide inserts

Newcomer Econo-Clamp Tool Holders provide a short-cut to economical production . . . machine down-time for tool grinding is minimized because multiple cutting edges on inserts can be utilized! Positive dual clamping features provide easy, quick and accurate indexing.

Econo-Clamps use standard full-length inserts or the more economical, short Newcomer "Throway" Carbide Inserts together with a hardened steel base anvil.

Newcomer Ad-Clamp Tool Holders are also available for use with standard rectangular blanks or the more durable Newcomer Step-Tip Blanks.

Send today for Newcomer Catalog 109-54!

NEWCOMER PRODUCTS, INC.
LATROBE, PENNSYLVANIA
General Sales Office: 512 Franklin Ave., Pittsburgh 21, Pa.

65. Carbide Blanks, Tools. A general catalog (109-54) covering the complete line of Newcomer Products, Inc., Dept. MTB, is now available. Included are sections on carbide blanks, inserts and tools, boring and roller-turner tools, and tool holders. A portion of the book is dedicated to technical data.

66. Air Conditioner. Bulletin No. 122, Niagara Blower Co., Dept. B, 405 Lexington Ave., New York 17, N.Y., describes and illustrates their Type A air conditioner, said to produce precise control of air temperature and moisture, which enables manufacturers to make their products in any climate.

67. Shears. Bulletin 69D, Niagara Machine & Tool Works, Dept. BB, 637 Northland Ave., Buffalo, N.Y., contains 40 pages of descriptions and illustrations of the company's underdrive power squaring shears. Bulletin 79-B concisely and fully describes the new No. 5-24 deep throat hand lever punch and shear.

68. Chucking Reamers. High speed steel straight fluted chucking reamers featuring a special surface hardening treatment are covered in new folder issued by

Pratt and Whitney, Div. Niles-Bement-Pond Co., Dept. MB, West Hartford 1, Conn.

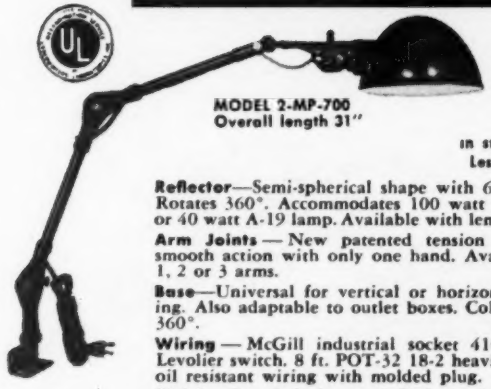
69. Grinding Wheels. A 28-page catalog (1748) describing its reinforced resinoid line of grinding wheels has been released by Norton Co., Dept. B, Worcester, Mass. Contains typical application photographs, tables of wheel sizes, prices, operating speeds and other data.

70. Die-Less Duplicating Equipment. Forming and fabricating material through the use of Di-Acro precision metalworking machines are described in a new 8-page booklet available upon request from O'Neil-Irwin Mfg. Co., 562 Eighth Ave., Lake City, Minn. "Quick Facts to Aid in Selecting Die-Less Duplicating Equipment" gives a concise summary of benders, brakes, notchers, punch presses, rod parters, rollers and shears.

71. Grinding Wheels. Rubber-bonded centerless grinding wheels are described in a bulletin being distributed by the Manhattan Rubber Div., Raybestos-Manhattan, Inc., Dept. MTB, Passaic, N.J. In most cases roughing and finishing

AMAZING *NEW* UTILITY

1954 FOSTORIA
LOCALITES
for Machine Tools, Assembly Inspection



MODEL 2-MP-700
Overall length 31"

$7.32 Each
In std. pkg. of 8
Less $9.15 ea.

Reflector—Semi-spherical shape with 6¾" orifice. Rotates 360°. Accommodates 100 watt A-21 or 60 or 40 watt A-19 lamp. Available with lens if desired.

Arm Joints — New patented tension disc. Easy, smooth action with only one hand. Available with 1, 2 or 3 arms.

Base—Universal for vertical or horizontal mounting. Also adaptable to outlet boxes. Collet revolves 360°.

Wiring — McGill industrial socket 4101-FL with Levolier switch. 8 ft. POT-32 18-2 heavily insulated oil resistant wiring with molded plug.

Finish—Gray baked enamel. Reflector interior, high temperature White.

Directs Light Exactly as Needed

WRITE for complete catalog of Localite models for every industrial use.

THE FOSTORIA PRESSED STEEL CORPORATION
Fostoria, Ohio
Localites available through wholesalers everywhere

LOCALITE by fostoria
for Light ON the Job
Reg. U. S. Pat. Off.

operation may be done with the same wheel.

72. Riveting Tools. The sixth edition of the Hi-Shear rivet tool catalog, the Hi-Shear Rivet Tool Co., Dept. MB, 8924 Bellanca Ave., Los Angeles 45, Calif., is off the press, Shows standard models of rivet sets, bucking bars, rivet removal tools and surface flushness gage. Part numbers have been assigned to tools to simplify ordering.

73. Hydraulic Grinder. Rivett Lathe & Grinder, Inc., Dept. MTBD, 18 Riverview Rd., Brighton 35, Boston, Mass., has prepared a 16-page catalog describing its Model 1024 internal and universal hydraulic grinder. Featured is the double-end wheelhead, which swings 180° for internal and external grinding.

74. Precision Tools, steel tapes, dial indicators, and hack saws are presented in 334-page catalogue of the L. S. Starrett Co., Dept. BB, Athol, Mass. Also available are bulletins describing dial indicators and contact points and satin chrome micrometers, as well as a booklet of prices.

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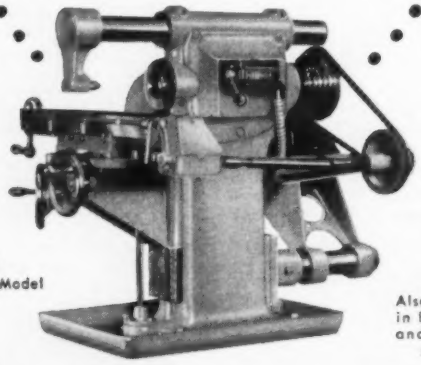
are so amazingly versatile they can almost reproduce themselves. Thousands in service in tool, school, development, repair and mass production shops.



Burke No. 4 Power Feed Model illustrated.

Also available in hand-feed and universal models.

Send for complete data on models, specifications and accessories.

THE U. S. BURKE MACHINE TOOL DIV.

Brotherton Rd. 1, Cincinnati 27, Ohio

75. Rotary Filing. Rota-Files, product of Rota File Corp., Dept. MB, 1974 66th St., Brooklyn, N.Y., are cutting tools said to be applicable in almost all fields of manufacturing of metal products, plastics, wood products. Rota-Files are made of high speed steel or carbides, in a complete range of shapes and sizes.

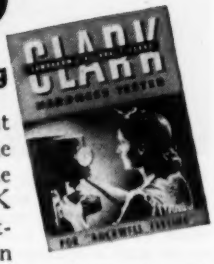
76. Driving Center, which replaces the driving dog by driving any turned or cylindrically ground workpiece from its end, is described in Bulletin No. 1162 by Zee-Hawk Machine Specialties, Inc., Dept. BB, 3716 W. Montrose Ave., Chicago 18, Ill. Workpiece can be machined over its entire length in one pass.

77. Pocket Comparator. The National Tool Co., 11203 Madison Ave., Cleveland 2, Ohio, has issued a folder describing the Pee-Gee pocket comparator, a precision optical measuring instrument for determining small dimensions. Magnifying lens is approximately six power.

78. Drilling Machine. A catalog of the layout drilling machine developed by the

GET THE FACTS

About Hardness Testing



Everything you need to know about hardness testing is told in this handsome book, prepared by the makers of the internationally respected CLARK Hardness Testers for "Rockwell Testing." Simple, easy-to-read text (in English) and numerous illustrations show the equipment and procedure for fast, accurate hardness testing of ferrous and non-ferrous materials. If you would like a copy, *free of charge*, just attach this ad to your letterhead or write "Send book." A copy will be mailed to you promptly.

P.S. If you are interested in descriptions and prices for CLARK Hardness Testers (Standard and Superficial) of *guaranteed accuracy*, say the word and we'll gladly supply them.

CLARK **CLARK INSTRUMENT INC.**
10206 Ford Road • Dearborn, Mich., U.S.A.

Cleereman Machine Tool Co., an affiliate of Bryant Machinery and Engineering Co., Dept. BB, 640 W. Washington Blvd., Chicago 6, Ill., is now being distributed. This machine has many applications for precision work which does not require tolerances closer than .001" per foot.

79. Transfer Punch. The Universal transfer punch, Universal Transfer Punch, Inc., Dept. BB, Box 412, Massillon, Ohio, is a convenient tool for transferring centers from a single pattern or template to any number of duplicates. No layout, no scribing is required. Folder sent upon request.

80. Power Units, Counterbores. The Ex-Cell-O Corp., 1212 Oakman Blvd., Detroit 32, Mich., has released two new bulletins made to fit the Ex-Cell-O complete catalog binder. Bulletin 45040 features the quill type hydraulic power units Styles 22 and 22-L. Bulletin 60446 covers standard Continental counterbores, holders, cutters, countersinks, pilots, and counterbore sets.

DY-NAMIC BALANCING
reduces stress, produces smooth operation of our crankshafts... and makes it so
EASY TO LOCATE EXACT POINT OF UNBALANCE...
QUICKLY, ACCURATELY!
says M. W. Stiller, Prod. Mgr., Joy Mfg. Co., Michigan City, Ind. A Model 375 "Bear" Machine is used here to balance crankshafts for portable air compressors.
Photograph shows operator drilling away excess metal at point of unbalance.

Speed and accuracy are but two of many advantages which make "Bear" Dy-Namic Balancing the proven technique to reduce wear of valuable machinery . . . eliminate noise and vibration . . . and improve performance of the finished product.

SEND FOR FREE DY-NAMIC BALANCING MANUAL to learn of all the advantages of "Bear" Machines, 20 pages of tables, diagrams, application photographs and latest tecnnological developments help show you how Dy-Namic Balancing can cut costs, mechanical failures and maintenance expense in your operation.

For your copy write: Bear Mfg. Co., Dept. M-20, Rock Island, Ill.

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STATIC AND DY-NAMIC BALANCING MACHINES
balance rotating parts weighing from 4 oz. to 8 tons

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WHY WAIT FOR SPECIAL TAPS?

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HIGH SPEED SPECIAL RIGHT HAND TAPS

SIZE	THREAD
4	32-48-60-64
5	30-32-36-48-80
6	30-40-48-56-60
7	32-40
8	24-30-36-38-40-44-48
9	24-28-32-40
10	28-30-36-40-48-64
12	20-28-32-36
14	20-24-28
1/16	60-64
5/64	72
3/32	48
7/64	48-56
1/8	32-40
5/32	32-36-40
9/64	36-40
11/64	36
3/16	20-24-32
13/64	32
7/32	24-28-32
1/4	18-24-26-27-30-32-36-40
5/16	16-20-22-27-28-32-40
3/8	12-16-18-20-27-28-32-36-40-48
7/16	12-16-18-22-24-27-28-30-32-36-40
1/2	12-14-16-18-22-24-26-27-28-30-32-40
9/16	16-20-24-27-28-30-32-40-48
5/8	12-14-16-20-24-27-28-32-36-40
11/16	11-16-18-20-24-27-28-30-32
3/4	9-11-12-14-18-20-24-26-27-28-32
13/16	10-14-18-20-32
7/8	10-12-16-18-20-24-27-28-32
15/16	8-9-10-12-14-16-18-20-24-32
1	10-12-16-18-20-24-27-32-40
1-1/16	12-14-16-18-20-24
1-1/8	8-10-14-16-18-20-24-32
1-3/16	8-10-12-14-16-18-20-24
1-1/4	8-10-14-16-18-20-24-32
1-5/16	12-14-16-18-20-24-32
1-3/8	8-10-14-16-18-20-24
1-7/16	8-10-12-16-18-20-24
1-1/2	8-10-14-16-18-20-24-28
1-9/16	18-20-24
1-5/8	5½-8-10-12-13-16-18-20-24
1-11/16	10-12-14-16-18-20-24
1-3/4	8-10-12-14-16-18-20-24
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20-24
1-15/16	8-10-12-14-16-18-20-24-28
2	4-½-8-10-12-16-18-20
2-1/16	12-14
2-1/8	12-16-20
2-3/16	12-16
2-1/4	4-½-8-12-14-16-18
2-5/16	12-18
2-3/8	12-16-18
2-1/2	8-10-12
2-9/16	18
2-5/8	12-16-20
2-3/4	16
2-7/8	8-12-16
3	8-16
3-1/4	8-12-16
3-1/2	8-12-16
3-7/8	6
4	8-12

HIGH SPEED LEFT HAND TAPS

SIZE	THREAD
0	80
1	56-64-72
2	56-64
3	56
4	32-36-40-48
5	40-44
6	32-36-40
8	32-36-40
10	24-30-32-40
12	24-28-32
1/4	20-28-32
5/16	18-20-24-28-32
3/8	16-24-32
7/16	14-20-28
1/2	12-13-20-28
9/16	12-18-20-24
5/8	11-12-18-20-24
11/16	11-16-24
3/4	10-16-18-20
13/16	16
7/8	9-12-14-18-20
1	8-12-14-16-18-20
1-1/8	7-12
1-1/4	7-12-16-18
1-3/8	6-8-10-12-16-18-20-24
1-7/16	8-10-12-14-16-18-20
1-1/2	6-8-10-12-16-18-20
1-9/16	8-10-12-16-18-20
1-5/8	8-10-12-14-16-18-20
1-11/16	8-10-12-14-16-18-20
1-3/4	8-10-12-14-16-18-20
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20
1-15/16	8-10-12-14-16-18-20
2	4½-10-12

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NOTE: Oversize, Undersize, Metric, 64th and 32nd Size Taps Available for Quick Delivery. We stock Special Sizes in High Speed Milling Cutters, Slitting Saws, End Mills and Reamers.

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MEASURE TO 1/10,000th

All graduations are well-defined black lines on dull chrome surface for easier and surer reading, even in poor light. Guaranteed accurate within one half of a ten thousandth of an inch.

Drop-forged model with chrome finished micrometer head, from $8.25 up. *Ask for Micrometer Catalog*

No. 901 C 0-1" Size with LOCK NUT and RATCHET and 10th vernier as shown $13.25

This tool with TUNGSTEN CARBIDE tipped anvils $15.75

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Wherever continuous hinges and metal corners are needed, you'll find the answer at Rex . . . a reliable source of supply with the finest facilities to meet your requirements. Hinges furnished in brass, aluminum, stainless and steel.

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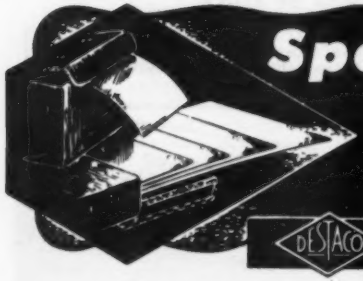

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Made from selected steel or brass, rolled to precision limits, oiled to resist stain and rust, free from burrs. Twelve assorted thicknesses .001" to .015", sheets 6" x 12", coils 120", identified every 6" by thickness and amount remaining on roll.

DESTACO DETROIT STAMPING COMPANY

347 MIDLAND AVENUE • DETROIT 3, MICHIGAN

Continued from page 330

Two-handed safety clutch

Benchmaster Mfg. Co., Dept. MB, 1835 West Rosecrans Ave., Gardena, Calif., recently announced a new electronic two-handed safety clutch, designed by Teletronic Laboratories. Designed for use on all devices requiring single-trip or single cycle control.

Machines cannot be tripped in any fashion except by simultaneous motion of both hands which sends a single electrical pulse to the solenoid. Controls are located out of danger areas. More production is

claimed because only finger touch is required, relieving fatigue and lost motion. Operators soon synchronize load, trip and unload motions into a time-saving sequence.

The Tele-Trol converts any mechanical clutch to electric solenoid actuation. Installation is a matter of moments, requiring only the drilling and tapping of two holes.

Use ACTION Card, opposite page 64, Encircle No. 44

Semi-finished carbide reamers

Super Tool Co., Dept. BB, 21650 Hoover Rd., Detroit 13, Mich., has announced that carbide reamers in a complete size range may be purchased in rough ground, semi-finished stage. They have adequate grinding stock so that (example) a ½" nominal size may be ground 0.490" to 0.516" and a 1" nominal size may be ground 0.990" to 1.020".

Use ACTION Card, opposite page 64, Encircle No. 45

Hammond of KALAMAZOO

2 IN 1

NO-DUST GRINDER

SAVE OVER 50% FLOOR SPACE THE HAMMOND WAY

OLD WAY

DUST-LADEN AIR IS A MENACE!

- Protect your employees' health.
- Protect nearby machine tools from dust and grit.
- Save floor space — requires only 6½ square feet.

For 10", 12", and 14" wheels. Write for Catalog.

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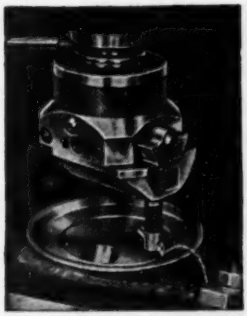
1614 DOUGLAS AVE. KALAMAZOO, MICH.



ONE Tool ONE Set Up

. . . for boring, facing, turning, recessing, undercutting.

MASTERHEAD

THE BORING AND FACING HEAD THAT THINKS FOR ITSELF

Featuring: automatic feeds, end release and return; adjustable stop; adaptable to all standard machines; highest precision; ideal for jig borers; nine models for work up to 36¼" dia.

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NON-ROTATING DRILL STOP
for Precision Hole Depth Control

Now you can be certain of positive control of hole depth with the WOHLNIP Precision Drill Stop . . . which is Non-Rotating. Will not mar, mark or damage the face of the work, fixture or bushing. Completely automatic, the WOHLNIP Drill Stop reduces human errors, simplifies difficult jobs, lowers machining cost, increases production and accuracy, eliminating rejects. Used for drilling, center drilling, countersinking, boring, milling, routing, reaming. Used on drill presses, radial drills, milling machines, lathes, turret lathes, hand and automatic screw machines. Available as shown and with standard straight and taper shanks for any size needed.

(Patent Pending)

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HOWALD CARBIDE MILLING CUTTERS

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PATENTED END MILL

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Over 85% of the torque wrenches used in industry are

STURTEVANT TORQUE WRENCHES

Read by Sight, Sound or Feel

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- Automatic Release
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in inch grams
...inch ounces
...inch pounds
...foot pounds

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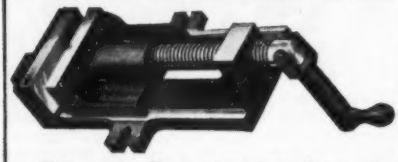
YOST DRILL PRESS VISE



This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

Offered in two sizes.

Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3½	3½	12½
2D	5	5½	23

Do you need a vise of ANY type?

Write today for bulletins on the extensive Yost line

YOST MFG. COMPANY

1335 SO. MAIN STREET

MEADVILLE, PENNSYLVANIA

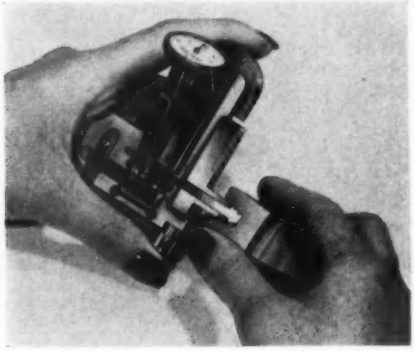
Adjustable snap gage measures three widths of "Christmas Tree" serrations

Federal Products Corp., Dept. B, 1144 Eddy St., Providence, R.I., announces a new portable, adjustable snap gage to measure the widths of "Christmas tree" serrations in a jet engine compressor rotor disc.

Small, compact and fully insulated from heat transfer by a wrap-around pregwood handle, this one gage will measure all three rows of blade serrations regardless of their angles. Uniform gaging pressure is independent of operator.

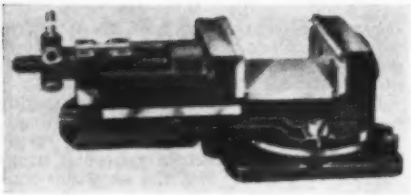
Designed with an extra long gaging depth, the rigid tool steel jaws are adjustable for extra wide measuring range. The reference contact (a spherical tungsten carbide ball), and the sensitive contact (two pieces of tungsten carbide rod) are accurately fastened to the jaws enabling immediate self-centralization. No rocking is required.

Use ACTION Card, opposite page 64. Encircle No. 46



Milling machine vise

J. E. Martin Machine Co., Dept. B, Springfield, Ohio, manufacturers of machine vises, has just brought out a new size of Gem milling machine vise. This vise is exact in design and construction to the No. 4 swivel-base and No. 5 plain-base Gem vises, being smaller, with jaws 4⅜" wide, 1¾" deep, and opening to 4" for use on smaller machines. The same features apply as in the larger size, with large diameter square-thread screw, one piece handwheel and nut, with hardened tightening holes, extra long bearing on



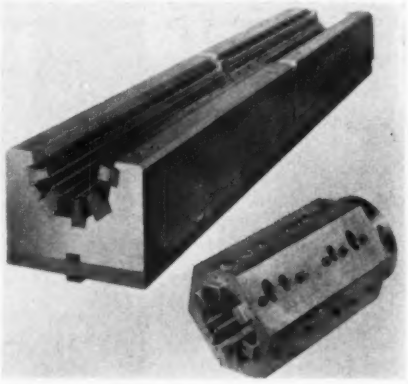
slide-jaw to prevent "kick-up," and extra heavy construction throughout. As in the larger size, the vise is held on the swivel-base with three "T"-slot bolts, instead of the usual two, giving much greater rigidity under heavy cuts. The vise is available in either swivel-base or plain base type.

Use ACTION Card, opposite page 64, Encircle No. 47

High speed steel broaches finish external surfaces on circular metal parts

A new line of broaches for finishing external surfaces on circular metal parts such as slots, flats, notches and contours usually produced by index or multiple milling operations is announced by National Broach & Machine Co., Dept. MB, 5600 St. Jean Ave., Detroit 13, Mich.

The broaches are made in a wide variety of sizes in two general types: an external surface broach type and an internal type. The surface broach type can be mounted on the ram of conventional single or dual ram surface broaching machines. It broaches up to half of

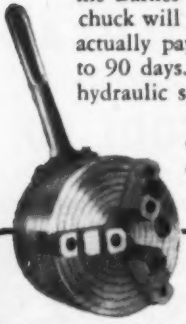


Labor Saving Production CHUCK

Will pay for itself in 60 to 90 days

On turrets, engine lathes, cutting-off machines, drill presses or any type of chucking machine, the Barker Two-Jaw or Three-Jaw hand operated chuck will increase production up to one third and actually pay for itself while doing it in from 60 to 90 days. Hand lever eliminates pneumatic and hydraulic systems, yet closes and locks jaws with lathe running or stopped. Over 30 years of labor saving, production boosting operation.

Write for bulletin 201 today.



CHUCK DIVISION
THOMAS HOIST CO.
24 S. HOYNE CHICAGO 12, ILL.

the periphery of a part in a single pass of the broach. If broaching operations are required around the entire periphery, the part which is mounted on a fixture on the broaching machine table, is indexed and completed by a second pass of the broach.

The internal type of broach is mounted on the table of conventional utility hydraulic presses and finishes the entire periphery of the part. In this arrangement, the part is mounted on a holder on the end of the press piston rod and pushed down through the broach. Two or more parts can be broached with each press stroke on a setup of this type by mounting more than one broach on the machine table and extra holders on a ram adapter. The 48" long external surface broach at the left in the photograph broaches 36 unequally spaced 0.050-in. wide, 3/16-in. deep slots in a 3½-in dia., 5/16-in. thick steel automotive automatic transmission fluid coupling hub. The broach is made up of two sections. Inserts in the second section broach the slots between those produced by the first section. The part is indexed for a second pass of the broach to complete the operation. This setup on a single ram broaching machine produces 90 hubs per hour. Broach life on this operation is 32,000 pieces per grind.

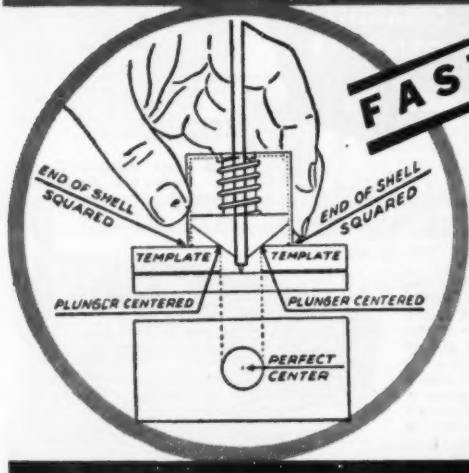
The 15-in. long internal broach at the right in the photograph broaches six equally spaced ¼ in. wide, 1/16-in. deep crimping slots in a 3 ⅝-in. dia., ¼-in. thick flange on a forged steel automotive universal joint yoke body. The broach inserts in this arrangement are in two sections. The latter sections produce a flat at the OD portion of each slot. Production rate on this operation is up to 600 parts per hour with two broaches on a single utility press.

Use ACTION Card, opposite page 64. Encircle No. 48

Tap and die holder for lathe

Designed for high-speed tap and die production on any lathe, a quick-stop reversible holder has been developed, called the Cobb tap & die holder. It is inserted in the tailstock of any lathe and can be brought to an instant stop by the operator by merely releasing his hold on the tool until the lathe is brought to a stop; it free-wheels on its ½" shaft held in the tailstock. Consists of a No. 30 Jacobs chuck and arbor, 0 to 5/16"

ACCURATE CENTERING

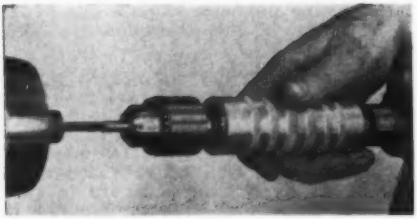


FASTER
UNIVERSAL TRANSFER PUNCH

Think of it! Without scribing, layout, measuring or "rule-of-thumb", you can accurately and instantly transfer a true center in any hole from ⅛" to 15/16" dia. Once you've used the Universal Transfer Punch, we are sure you will agree with hundreds of other users that this is the handiest tool in the shop.

Made in 3 sizes. Send today for free fact-filled literature and prices. No obligation.

UNIVERSAL TRANSFER PUNCH, INC.
Dept. BB • Box 412 • MASSILLON, OHIO



and a special ½" shaft for mounting in the lathe's tailstock.

One end of the holder takes a 13/16" o.d. button die. The Jacobs chuck and arbor can be replaced with a 1" o.d. button die on the other end. Only when the operator grips the shank or holder do the tap and die operate.

The holder is made of aluminum, anodized and intermittently knurled for a comfortable, secure hand grip. Two set screws in each end of the holder lock the chuck and dies. Cobb Precision Co., Dept. MB, 1042 N. Cole Ave., Hollywood 38, Calif.

Use ACTION Card, opposite page 64, Encircle No. 49

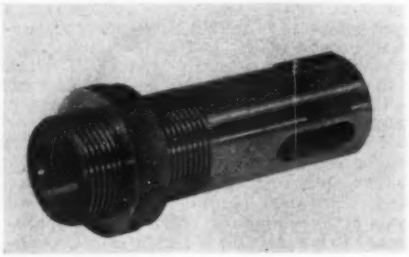
Economy offers new "Tru-Loc" adjustable adapter

Accuracy in production is claimed when the new interchangeable adjustable adapter and nut is used with multiple spindles for drilling operations.

These adjustable adapter assemblies are manufactured to comply with standard precision specifications.

"Tru-Loc" adapters are available from stock. Economy Tool & Machine Co., Dept. MB, 1829 S. 68th St., Milwaukee 14, Wis.

Use ACTION Card, opposite page 64, Encircle No. 50



Beverly THROATLESS SHEAR

Cut any Shape... STRAIGHT OR IRREGULAR

B-3 with Ball Bearing Hold Down

Make any cut — curved, straight or irregular, faster, easier and better with less material waste on a Beverly Throatless Shear. You can turn work to any position and make a clean cut as you go. Handles heavy gauges with ease—lighter metals without distortion. 4 models — capacities 18 gauge to 3/16" mild. All shears equipped with H.C. H.C. Blades for cutting Stainless.

INSIDE SLOTTER

8" Reach — 16 ga. cap.

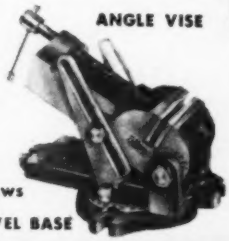
Makes inside slotting cutting faster, easier, cleaner. Punch and die arrangement of 5 blades assures accuracy, clean cutting action. Cuts 2½"x⅛" slot at one stroke. Throat design permits pivoting work at any point in stroke for special inside cuts. Note sample cuts at left.

See your Beverly Dealer or write for illustrated catalog.

BEVERLY SHEAR MFG. CO., 3005 W. 111th ST., Chicago 43, Ill.

PALMGREN

ANGLE VISE

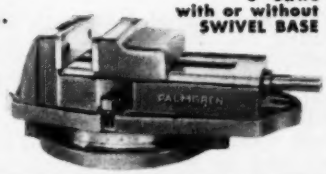


4" Jaws with SWIVEL BASE

for MILLING MACHINES, DRILL PRESSES, GRINDERS, SHAPERS... Built sturdy and rugged for tough heavy jobs. Accurately machined. IMMEDIATE DELIVERY Complete line of Machine Tool Accessories. Write for catalog 2028.

MILLING MACHINE VISE

6" Jaws with or without SWIVEL BASE



CHICAGO TOOL AND ENGINEERING CO., 8383 South Chicago Avenue, Chicago 17, Illinois

TAP MAGIC

STOPS TAP BREAKAGE

Cuts clean threads — acts instantaneously
Frees stuck taps and reamers right now!
Speeds tapping — not a cutting oil

Dealers and jobbers: Some territories still available.

Write:

SMITH TOOL & ENGINEERING CO.
A division of Smith-Cage — Yucaipa, California

You Need an Extra Hand Now to Speed Up Production!

HEIMANN TRANSFER SCREW SETS

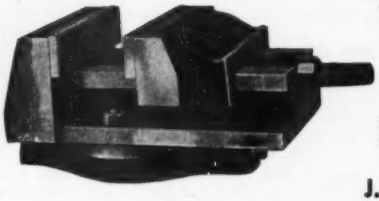
IN 11 SIZES—No. 6 to 1" N.C. In all S.A.E. sizes.

Here is the *faster*, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money too!

HEIMANN MFG., CO. ● URBANA, OHIO

PLUNKET IMPROVED VISES

We make a complete line of modern vises for drill presses, shapers, milling machines and grinders. Illustration shows our standard milling machine vise as regularly furnished and stocked.



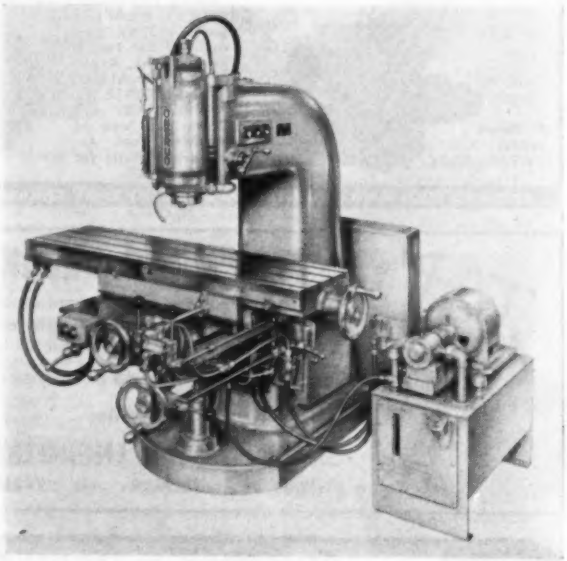
In ordering this vise give size of slot in table:
No. 10—6" jaws, 1½" deep, opens 5" wt. 45 lbs. ..... $ 81.84
No. 20—10" jaws, 2¼" deep, opens 8½" wt. 120 lbs. $110.88

Best material and workmanship. Prices are net f. o. b. Chicago. *Dealers' inquiries are solicited.*

Write for folder TODAY.

J. E. Plunket Machine Co. 3230-32 Archer Ave. Chicago 8, Ill.

High speed milling of non-ferrous metals with new hydraulic-powered Onsrud



The new Onsrud A-245 milling machine brings a medium-sized hydraulic-powered unit to the metalworking industry with application in every field where high speed milling or non-ferrous metals is required, according to the manufacturer, Onsrud Machine Wks., 3908 Palmer St., Chicago, Ill.

The A-245 increases normal milling speed of all sizes and shapes of parts from 100% to 600% it is said. It also includes all the hydraulic feeds and speeds usually found in more expensive units with manual feed for close adjustment.

Among features are: The new, centrally located, simplified hydraulic feed controls; the fact that manual control can take over at any time without stopping the hydraulic system; the directional, knee, cross and table feed controls with five forward and reverse positions including rapid traverse; table speeds 0 up to 150 ipm.

The 7½-15 hp, 3600/7200 rpm spindle motor is raised or lowered by air and manually operated for close adjustment; all manual dials are large and legible; three special valves actuate hydraulic feeds of table in all directions, longitudinally, cross and knee. The operator moves the lever on each of these valves in the direction of the required travel and the table speed increases as the lever angle is increased from the vertical neutral position to rapid traverse. Dogs limit table travel resetting valves to "off" position. Thus each valve automatically combines direction, speed and travel limit control.

Knee can be locked to any height with gib clamp which is interlocked with hydraulic lift. Gib must be unlocked before vertical travel can begin.

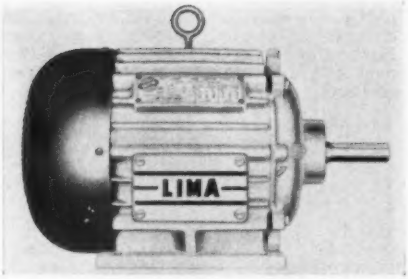
Push buttons for starting cutter motor and high and low speed are mounted on the side of the head column. Cutter motor can be raised or lowered 8" by air pressure or manually for fine adjustment. Gib clamp locks cutter motor in position. Motor is furnished with hand operated brake. Bearings are preloaded to avoid play.

Capacity is 19¾" less cutter width; length 28". Table size is 14" by 26", travel 28", 0 to 200 ipm; cross slide travel 14", 0 to 200 ipm; knee travel 10", 0 to 50 ipm. Two hp hydraulic power unit, 1,200 rpm, pump range to 350 psi, 20 gallon tank. Push buttons for starting and stopping mounted conveniently on front of base near controls. Lubrication: Mist feed on motor; Bijur pressure feed on table and cross slide. Pressure grease on balance of slides and bearings. Coolant mist feed on the cutter.

Use ACTION Card, opposite page 64. Encircle No. 51

Lima announces new motor line

The Lima Electric Motor Co., Dept. 119, 270 Findlay Rd., Lima, Ohio, is now manufacturing a completely new design of totally enclosed, fan-cooled motor. The new Type E is available in ratings of ¾ h.p. at 900 rpm to 20 h.p. at 3600 rpm in NEMA frame sizes 224 to 326 inclusive. Features claimed include: Rigid, seasoned



cast iron frames with integral feet. Deep, integrally cast fins provide extra heat dissipating surface resulting in cooler operation. Double-width prelubricated sealed ball bearings require no greasing or cleaning for normal life; correct quantity of lubricant is sealed in . . . dirt and moisture are sealed out. A specially designed cast aluminum fan provides high velocity air over the cooling fins. This rapid movement of air does not permit dust, dirt or other foreign matter to accumulate on the motor frame. Electrical characteristics: 2 or 3 phase, all standard frequencies and commercial voltages below 600 v, as required. These motors can be supplied for vertical, wall or ceiling mountings, as well as standard horizontal floor mounting.

Use ACTION Card, opposite page 64. Encircle No. 52

Dumore develops new heavy-duty handgrinder for high-speed milling and grinding application

The Dumore Series 35 handgrinder is designed for grinding and milling. A ¼ hp continuous-duty-rated universal motor delivers speeds up to 35,000 rpm. It's available for 115 V or 230 V DC or AC, 0-60 cycle operation with ⅛" or ¼" collet chuck.

The Series 35 can be used with tung-

I'm the W.H.O.* of

WHO'S WHO

in the precision screw machine products field

Making the finest

SET SCREWS CAP SCREWS
COUPLING BOLTS
MILLED STUDS

. . . our specialty

*Wm. H. Ottemiller Co.
YORK, PENNA.

Ottemiller products are sold through Mill Supply Houses and Industrial Distributors.

Adjustable Automatic Stock

FEED STOP for DIES

Dahlstrom AUTOSTOP

No drill jig . . . no slotting . . . no milling. Specify whether for use on blanking, progressive or compound dies. Mounts on stripper plate in 15 minutes. $1.75 each; $18 doz.

Write for Autostop-Tap Guide Bulletin.

BRANCH MFG. CO.
North Branch, Minnesota

$1.75

sten carbide mills, high-speed cutters, mounted wheels and points, abrasive bands, etc., for grinding, milling, finishing, and polishing materials ranging from wood to hard alloy steel. Overall length including chuck is 10¾". Body diameter is 2-7/16", while small diameter is 1-5/16". Weighs slightly over three pounds.

The Dumore Co., Dept. MB, 1300 Seventeenth St., Racine, Wis.

Use ACTION Card, opposite page 64. Encircle No. 53

New fluoroscope permits low cost quality control

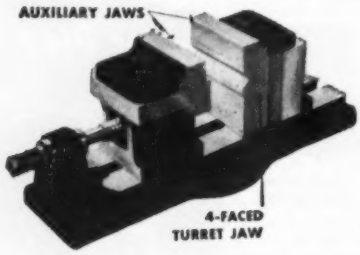
Visual X-ray inspection of many parts and materials can be quickly accomplished at low cost with the new Adrian "QC" (Quality Control) fluoroscope, according to J. W. Dice Co., Dept. B, Englewood, N.J.

This new inspection device loads from the front and can be supplied with a push button control for rapid opening and closing of the hood. Fluoroscopic screen size of the standard model is 16" x 23" and the inspection area is 18½" x 26". A Class "A" cabinet affords complete operator protection.

Typical uses are: Locating internal defects in plastic, ceramic or light alloy parts; detection of metallic or other inclusions in textiles, foods in cans, drugs; inspection of small assemblies for missing parts or for correct internal alignment of parts.

Use ACTION Card, opposite page 64. Encircle No. 54

SAVE SET-UP TIME

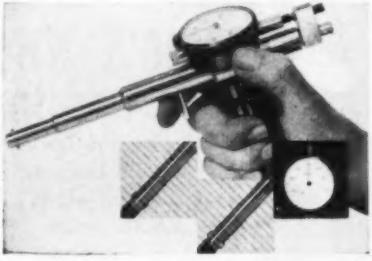


Brown Turret-Jaw Utility Vises cut production costs by eliminating time wasted on "rigging" set ups. It improves work quality because of rugged construction and ability to hold work tightly.

For complete specifications and prices write for Bulletin 23B, Brown Engineering Co., 126 N. 3rd Street, Reading, Pa.

BROWN UTILITY VISES

PRECISION PLUS!!



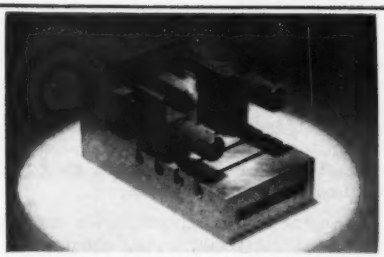
INTERNAL GROOVE GAGES

For Thread Reliefs "O" Ring and Snap Ring Grooves

Accuracy to less than ±.0001—Ranges from .300" to 6.000"—Inreach to 30".
Lightweight for faster, easier operation. Write TODAY for full data!

RIMAT TOOL COMPANY

Dept. MB-9, 21 W. Dayton, Pasadena 2, Calif.



SQUAR-UP

COMBINATION ANGLE PLATE AND PRECISION VISE WITH TWO INFINITELY POSITIONABLE JAWS. GIVING YOU GREATER UTILITY AT LESS COST, IN TOOL ROOM, PRODUCTION SHOP AND INSPECTION DEPT.

WRITE FOR FREE CIRCULAR

KEARSARGE TOOL & MANUFACTURING COMPANY, R.D. NO. 3, ERIE, PA.

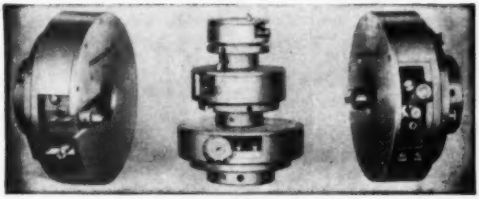
New

ZERO-ZERO COMPARATOR GAGE

For Accurately Constructing and Inspecting Jigs, Fixtures, Gages, Dies, and Machine Parts

For further details write

GARREAU & CO. 351 THAMES ST. NEWPORT, R.I.



MUMMERT-DIXON

FACING HEADS

with Automatic Feed

One-way Tool Feed — 6, 9 and 12" sizes.

Two-way Tool Feed — 9, 12, 16, 20, 24, 30, 36, 40 and 46" sizes.

Save many costly set-ups.

Bulletin No. 4141 Gives Full Details

MUMMERT-DIXON CO., 122 Philadelphia St., Hanover, Pa.

CLOSED — TRADE AUTOM MARK — CLOSED

Plain Type — **Offset Type**

OPEN — OPEN

CONTINUOUS HINGES

All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

THREE-FOURTHS OFFSET

AUTO MOULDING & MFG. CO.
1110 E. 87TH ST.
CHICAGO 19, ILL.

SPECIFICATIONS:
Open width 7/8" to 6"
Gage Material .040 to .125
Pin Diameter .101 to 3/8
Lengths to 120"

SEMI-OFFSET

Hack saw blade assortment

A new industrial hand hack saw blade assortment, which will give users economies of 20 to 30 per cent, is claimed by Henry Disston & Sons, Inc., Dept. B, Tacony, Philadelphia 35, Pa. It is especially designed for the industrial user or contractor who is cutting various kinds and sizes of metal.

Called the "No. 100 Disston Di-Mol assortment," each box contains 100 12-inch blades, with from 14 to 32 teeth to the inch, and in varying proportions based on average cutting conditions.

Use ACTION Card, opposite page 64. Encircle No. 55

Dual-Wedg Lock makes new cutter series possible

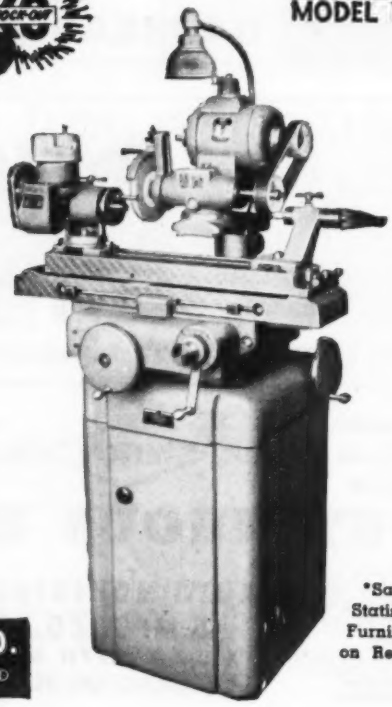
The new Dual-Wedg Lock, recently introduced by the Wesson Co., Dept. B, 1220 Woodward Heights Blvd., Detroit 20, Mich., now makes possible an improved stagger tooth and half side milling cutter series, recommended for most general purpose straddle, face, gang milling and slotting operations.

The new Wesson cutter series, employing the Dual-Wedg Lock, consists of a

There's a reason 71%*

of all popularly-priced Tool and Cutter Grinders sold in 1953 were "Knock-Outs"

MODEL B860



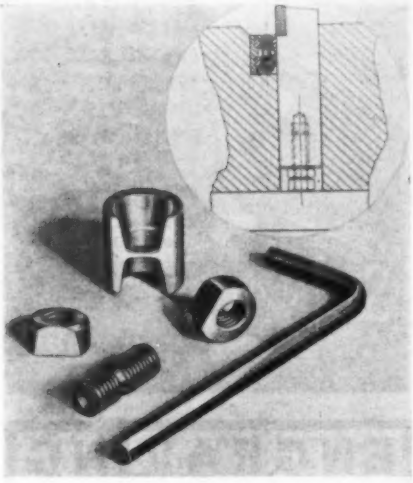
Will do anything that machines costing 2 or 3 times more will do . . . yes and in less time.

Distributed Only Through Franchise Dealers

K. O. LEE CO.
ABERDEEN S. D.

*Sales Statistics Furnished on Request

hardened steel body, broached blade slots and replaceable blades. Both the blades, tipped with Wessonmetal Carbides, and the cutter body are serrated for ease of adjustment. The 60° X 1/32 pitch serrations also make finer positive adjustment possible. The greater depth of the 60° serrations makes this positive adjustment much easier.



The cutters' Dual-Wedg Locks slip easily into a cylindrical recess in the body and the two wedges are locked on the face of the blade by several turns of the lock lead screw. One of the principal features of the Dual-Wedg Lock giving added advantages to the new cutter series is its simplified operation, enabling rapid blade setup and adjustment.

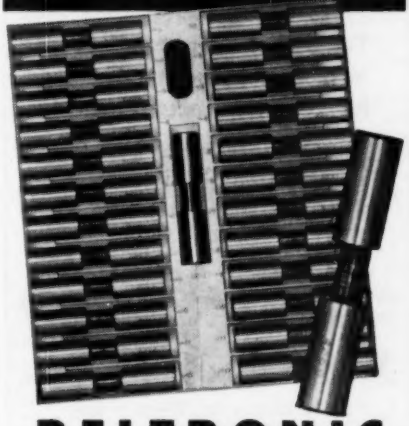
The lock seats itself both axially and radially even if the blade being locked has a step, is out of square or slightly tapered. Available in diameters of 5", 6", 8", 10" and 12". Standard widths of both series cutters, determined by blade widths, are ⅝", ¾", 1", 1¼" and 1½".

Use ACTION Card, opposite page 64, Encircle No. 56

High capacity springs

Two new series of high capacity Wales Hydra Springs using compressible liquids have just been announced by the Hydra Springs Div., Wales-Strippit Corp. These are said to provide respectively up to 6000 lb. and 8500 lb. force in a relatively

CLOSER PRODUCTION TOLERANCES!



DELTRONIC
Tenth Plug Gauges

save time and material, too!

This new system of precision gauging in sets of 25 provides one gauge of nominal size plus 12 gauges of increasingly larger sizes in .0001" increments and 12 gauges of decreasingly smaller sizes in increments of .0001".

- ★ Size variation by ten thousandths
- ★ Available in increments of 1/64" from 1/8" to 1"
- ★ Set of 25 costs approximately same as Go and No Go gauge
- ★ Hardness is Rockwell C62/C64

For further information write Dept. D.

DELTRONIC
CORPORATION
9010 BELLANCA AVENUE
LOS ANGELES 45, CALIF.

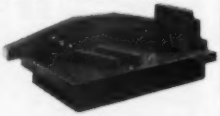
DON'T SCRAPE
DON'T SCRAP
worn surface plates
them either . . .
Step-them-down and
continue using them
for less accurate work.

You'll save enough money
to replace with Rahn Diabase
for your most accurate work.

It's being done. Many companies have adopted this NO COST way of converting from metal to Rahn Diabase (black granite) Surface Plates.

PROVE IT YOURSELF... FREE 30 DAY TRIAL
WRITE FOR BOOKLET ON DETAILS.

THE COMPLETE LINE
Surface Plates • Angle Plates
Straight Edges • Parallels



RAHN GRANITE SURFACE PLATE CO.
639 N. Western Ave., Dayton 7, Ohio

STEEL
Stanho
PRODUCTS
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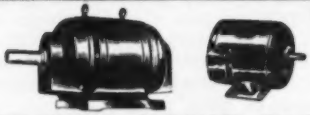

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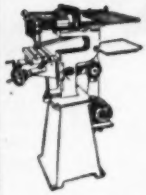

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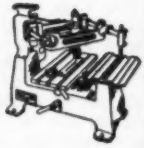

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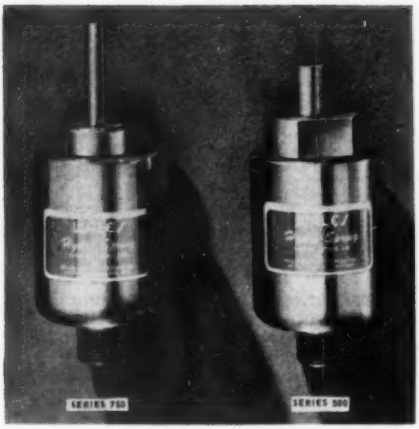


small space. They measure 2¼" in dia. by 4¼" long and produce as much spring force as a large 6" diameter by 8" long with 1⅛" wire railroad car spring. Wales-Strippit Corp., Dept. B, 396 Payne Ave., North Tonawanda, N. Y.

Use ACTION Card, opposite page 64. Encircle No. 57

Basic improvements in 7" grinders announced by Delta-Rockwell

Basic improvements in all single-phase and three-phase models of its standard 7" grinders and buffers have been announced by the Delta Power Tool Division of Rockwell Mfg. Co., Dept. BB, 432 N. Lexington Ave., Pittsburgh 8, Pa.

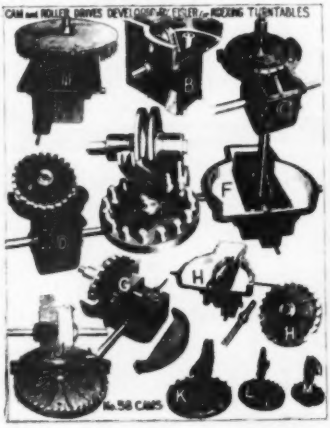
The improved models, have been designed to offer higher starting torque, higher breakdown torque, lower operating costs and greater adaptability, the manufacturer reports.

The improved single-phase models feature capacitor start motors in place of the split-phase motors used on earlier models, and all single-phase and three-phase models except the 550-volt model have been changed from single to dual voltage. (The 550-volt three-phase model has been developed primarily to meet the needs of Canadian industry which is currently changing three-phase power east of the Manitoba-Ontario border to 550-volts.)

The dual voltage feature allows the improved single-phase models to operate on either 115 or 230 volt current and three-phase models (except the 550-volt models) on 220 or 440 volts. This in effect doubles the number of models available and in-

INDEXING TURNTABLES AND POSITIONERS

Eisler makes over 100 different types for welding, brazing, soldering, spraying, glass insulators, melting and glass glazing with rotating stations and motorized or hand operated. Rotating tables of all kinds for over 33 years. We supply any part or complete equipment and we make special turntables to your order and cams made to order.



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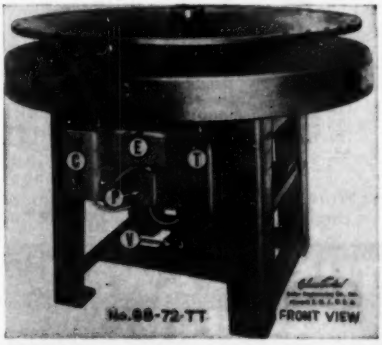

DR. CHAS. EISLER M.E., PRES.
EISLER ENGINEERING CO., INC., 762 So. 13th Street, Newark, N. J.

● Adjustable to 0.0002-inch, the new improved MASTUR boring tools feature precision, speed and long service life. New body and block construction permits these tools to take heavier cuts at higher speeds — to do more work in less time.

Adjusting-screw head is graduated into 50 divisions to provide readings in thousandths, and body is graduated to permit vernier readings of 0.0002-inch. The three models available have maximum boring bar capacities of 1/2, 3/4 and 1-inch and boring range from 3/8 to 15 inches.

DBS-MC

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THE MAXWELL COMPANY

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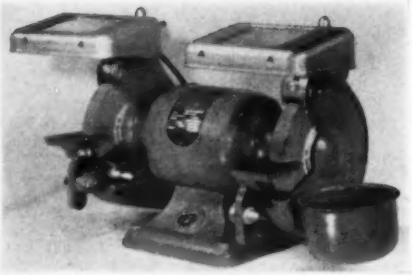


sures earlier delivery by simplifying stocking problems of dealers. It also increases the versatility and adaptability of each machine.

An additional new feature of the improved three-phase models is a separate toggle switch for the lamps which enables them to be turned on or off independently of the machine itself.

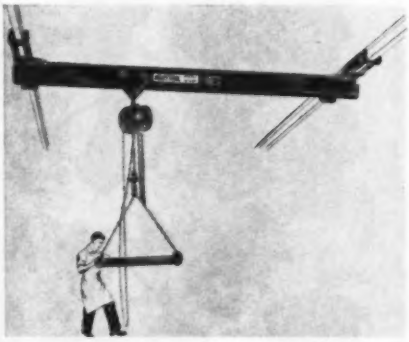
Use ACTION Card, opposite page 64. Encircle No. 58

Industrial push-type cranes improved

Industrial Crane & Hoist Corp., Dept. B., 315 N. Ada St., Chicago 7, Ill., announces a new expanded line of push-type cranes with new, improved construction features.

A light duty model in five different capacities and heavy duty models in seven capacities are available.

All industrial heavy duty push-type cranes are available in various spans and can be equipped with hand operated or electric hoists.



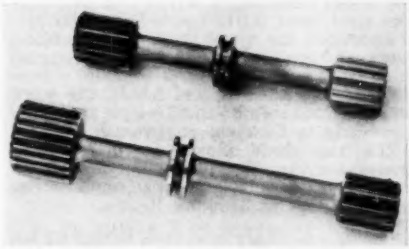
Photograph shows an industrial push-type crane handling heavy, bulky Diebel high production presses in plant of Di Machine Corp., Chicago.

Use ACTION Card, opposite page 64. Encircle No. 59

Special stainless steel solves fatigue problem

The aircraft pump shafts pictured here were originally made from 4140 steel and failed due to fatigue after a comparatively short time. The shafts are subject to quickly changing loads plus rapid acceleration and deceleration.

Denison Engineering Co., the fabricator, then tried out 440-C stainless steel and beryllium copper with no markedly better results. They finally solved the fatigue problem with Armco 17-4 ph (precipitation-hardening) stainless steel.



Under test conditions, the 4140 steel

It's the wHOLE Truth.....
Double eccentric type for irregular spacing
Universal joint with slip spindle fixed locating plate
Single eccentric type for equally spaced holes on bolt circles
US HEADS
Machine tool men "in the know" have long acclaimed the "US" Adjustable Multiple Spindle Drill Heads with their quick-change universal joint assemblies. They are built for continuous use, with full anti-friction bearing construction for high capacity thrust loads. The universal joint adjustable multiple spindle type is suitable for any sensitive drilling machine. Joints are self-lubricating.
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The new double eccentric AdjUStafix, two to eight spindles, permits spindles to be located in non-symmetrical patterns. It eliminates expensive change in set-up.
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lasted less than one hour, beryllium copper about nine hours, while 17-4 ph stainless steel went thirty hours before failure. It exceeded the usual limit of ten million reversals established for testing fatigue.

Ease of machining and hardening were other advantages of the 17-4 ph material, according to Denison engineers.

The top shaft shown in the picture operates under 35 ph at 4500 rpm. Maximum torque is 600 in. lbs., and shear section is set at 2,000 in. lbs.

The lower shaft operates under 60 hp at 4500 rpm. Maximum torque is 1,000 in. lbs., and shear section is set at 3,800 in. lbs.

Use ACTION Card, opposite page 64, Encircle No. 60

Lyon revolving bins

Lyon revolving bins are for bulk stock, parts, nuts, bolts, screws, etc. Shelves revolve easily in either direction on ball bearing rollers. Each shelf has five permanent dividers and continuous label-holders. Additional dividers can be added.

Shelves are stabilized to prevent sagging when unevenly loaded. Broad base

SIGOURNEY

M-100

the PRECISION BENCH DRILLING MACHINE

No ordinary bench drilling machine, but an extremely accurate, high speed, sensitive machine for precision drilling. Drills from ¼" down to extremely small sizes. Successfully used down as far as .008".

Table and column exactly squared, one to the other, and built with strength and rigidity for maintained accuracy. Hardened and ground spindles insure long life. Sealed ball bearings throughout for smooth operation from 4,000 r.p.m. to 10,000 r.p.m. Motor, driving belt, and spindles entirely enclosed for safety. Available with 1, 2, 3 and 4 spindles.

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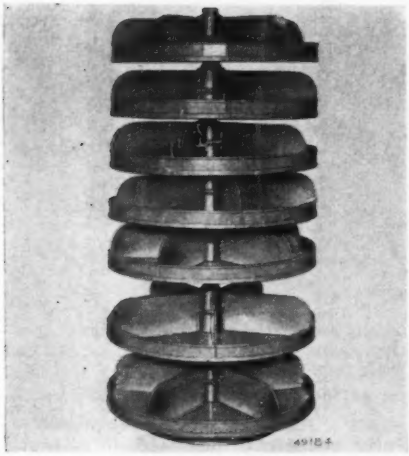

prevents tipping. Finish—Lyon Green baked-on enamel. Available in: 7 shelf unit—34″ diameter x 65-11/16″ high; 4 shelf unit—34″ diameter x 37-11/16″ high. Lyon Metal Products, Inc., Dept. BB, Aurora, Ill.

Use ACTION Card, opposite page 64. Encircle No. 61

New device maintains materials at machine feeding level

The feeding and receiving Portelvator (R) pack lifters illustrated are the most recent to be added to the line manufactured by The Hamilton Tool Co., Dept. B, 826 S. Ninth St., Hamilton, Ohio.

These Portelvators are designed for pit installation. Lift load capacity is 2200 lbs. Rise is 16″ from floor level at a speed of 27.5″ per minute.

Each machine is operated by means of a ¾ hp motor with reversing magnetic starter, push button controlled, and each machine is equipped with a gear driven limit switch. An 8″x18″ operator station is provided on the long side of the 45″ x 48″ table. Apron extends 1″ below floor level when table top is at maximum height.

Power transmission is mechanical, through meshed worm, worm gear, and screw, and neither mechanical failure nor power failure can cause the table to fall or "settle."

Portelvator pack lifters are made in many sizes, and with operating features from completely manual to 100% automatic. Many are intended to receive floor trucks, thus saving transfer of ma-

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Low cost, immediate control of dust from one remote dust source, or from a whole shop!

300 cfm to 10,000 cfm per unit (22 models) standard, pre-tested, available from stock. Ask for catalog 605-2. No obligation.

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"One-hand control" over all movable elements leaves the operator's other hand free to control rotation of the part being checked. Either headstock or tailstock can be unclamped, positioned and locked in place with a single hand operating the top lever. Investigate this bench center today.

Complete Range as Follows:

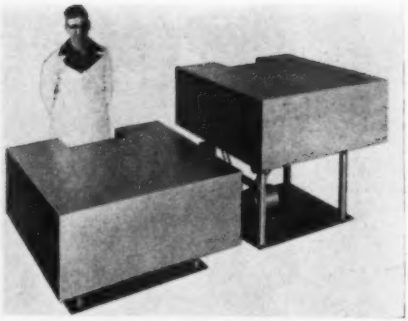
6" x 18"	12" x 48"	24" x 48"
6" x 36"	12" x 60"	24" x 60"
12" x 36"	12" x 72"	24" x 72"

FREE Additional Data

covering complete specifications and additional features is contained in this bulletin. Write for your copy. Ask for data sheet 448

SUNDSTRAND

SUNDSTRAND MACHINE TOOL CO.
2535 Eleventh Street, Rockford, Ill., U.S.A.



terials from truck to table. Many operate from "below-floor-level" minimum with up to 120" rise.

Use ACTION Card, opposite page 64. Encircle No. 62

Fully automatic hot-cold testing unit announced

A new automatic testing chamber, which automatically cycles test parts through alternate hot and cold temperatures, has been announced by Cincinnati Sub-Zero Products Co., Dept. B, 3932 Reading Rd., Cincinnati 29, Ohio.

The unit, which has a test chamber 30" long x 11" wide x 16" deep, produces first a low temperature, down to -120°F. It then raises the temperature to +200°F. and will repeat the cycle as many as 100 times. Holding time at high and low levels is variable with a dual-set timer which determines half-cycle time anywhere between 0 and 120 minutes.

A new low temperature chilling machine designed to meet the needs of small heat treating departments, and laboratories, has also been announced.

Model A-120-1, weighing just 500 pounds, and mounted on casters, is 20" long, 18" deep and 43" high. The capacity of the chilling chamber is 1 cubic foot. Temperature range is from -70° to 120°F. Its extremely compact size combined with its low temperature is said to make it suitable for many small scale chilling operations.

With the addition of a simple air circulator, the temperature range of the unit will be from +70°F to -120°F. Temperature range from +250°F. to -120°F. can be obtained with the addition of a heater. For testing requirements, a wide variety of control instrumentation is available, including indicating and recording control thermometers.

Use ACTION Card, opposite page 64. Encircle No. 63

Miccro Supreme

LAY-OUT AND IDENTIFICATION DYE

For Tool, Die, Pattern or Template layout on metal . . . Quick identification of bar stock, sheets, strips or parts . . . Shows up in sharp relief—dries instantly . . . Write for sample and circular on company letterhead.

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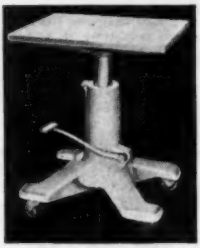

Saves TIME and LABOR

Eliminate heavy lifting and cut handling costs. Slight foot pressure varies height from 31" to 46½", leaving operator's hands free. Table swivels and locks in any position.

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PIONEERS and PACE-MAKERS in their line

—head rivets from smallest to ¾" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—sizes to meet all needs—types include Vertical and Horizontal Multiple Spindles.

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The precision of a machine tool plus the durability of a workhorse. Complete with ½ H.P. Heavy Duty Motor and automatic band tension control. Nothing like it for finishing metals, plastics, wood, fibre, etc.

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broken tools made like new again with NU-TANGS

Twisted or broken tangs replaced at low costs on any tool with a Morse Taper (sizes 1 to 6). Hundreds of leading industries save money on drills, reamers, countersinks, cutters, drivers, the NU-TANG way. Prompt delivery. Send for prices—or send tools for repair. All work guaranteed.

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Send them to us like this! GUARANTEED STRONG AS NEW! *We return them like this!*

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NU-TANGS INC. 1331 Bates Avenue Cincinnati 25, Ohio

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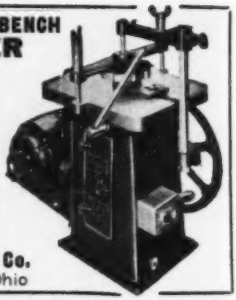

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3¾" stroke; adaptable for other work.

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Precision ground square and parallel to .0004/in. non-cumulative. Ground dovetailed slide; Hardened and ground jaws. Dustproof enclosed screw. Ample clamping grooves. Excellent for jig-boring, precision grinding, inspection. 10 day money-back GUARANTEE.

Dealer inquiries invited

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Sturdy 16 ga. metal. 20" long x 12" wide x 6¼" deep. Drag holes and handles at both ends.

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KING PORTABLE BRINELL

for all HARDNESS TESTING. Throat 4", Gap 10". Wt. 27 lbs. — ACCURATE

Puts actual load of 3000 KG on 10 mm. ball. Test head removable for testing very large parts.

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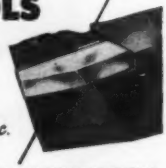

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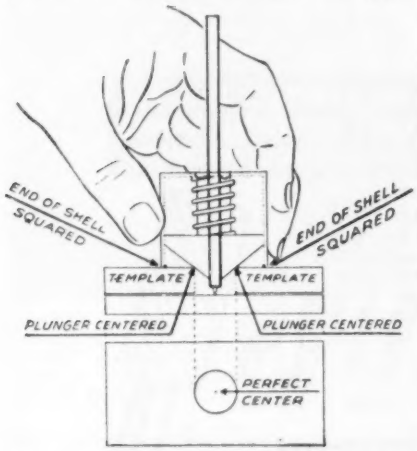
CEMENTED CARBIDE TOOLS, BLANKS, MILLING CUTTERS

Transfer punch dispenses with layout, scribing

A true center is transferred in any hole from ⅛" to 15/16" dia. with the Universal transfer punch, product of Universal Transfer Punch, Inc., Dept. BB, Box 412, Massillon, Ohio.

Based on the principle of a cone and a plane, it transfers centers from a single



pattern or template to any number of duplicates. No layout and no scribing is required.

Operation is simple: Set plunger in hole—it's self-centering; push shell down with fingertip pressure—it squares itself with the surface; slide punch down and tap with hammer.

Use ACTION Card, opposite page 64. Encircle No. 80

B & S improve bench centers

The Brown & Sharpe Mfg. Co., Dept. B, Providence, R.I., announces changes in design and improvements in its bench centers. A typical setup, with the centers on optionally furnished raising blocks, is shown in the illustration.

The bed of the bench centers has been streamlined and modernized. It is of U cross-section, heavily ribbed with a three-point bearing. The headstock and footstock are adjustable individually and can be locked securely at any position on the bed. For supporting heavy work the spring-actuated center may be locked in position.

Bench centers are furnished with or without dial test indicators. Dial gage

NEW Mall

MIDGET AIR DIE GRINDER

This 12 ounce, palm-size midget creates a sensation in every shop in which it is introduced. A precision Erickson collet die grinder for day-long production. For use with mounted points and carbide burrs where accuracy is a "must." Features a new "patented" noise silencer that makes it a pleasure to use.

Model No.	Speed (rpm.)	Collet Size	Side to Center	O.A. Length
PG-K-1030L	30,000	¼"	⅝"	4⅝"

40 Factory-Owned Service Warehouses, Coast to Coast, to Give You Fast, Dependable Service.

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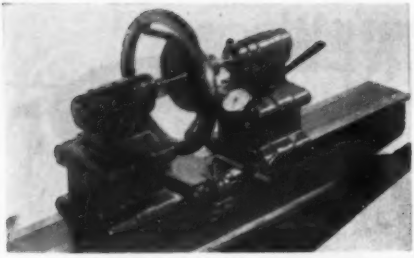
MU-122



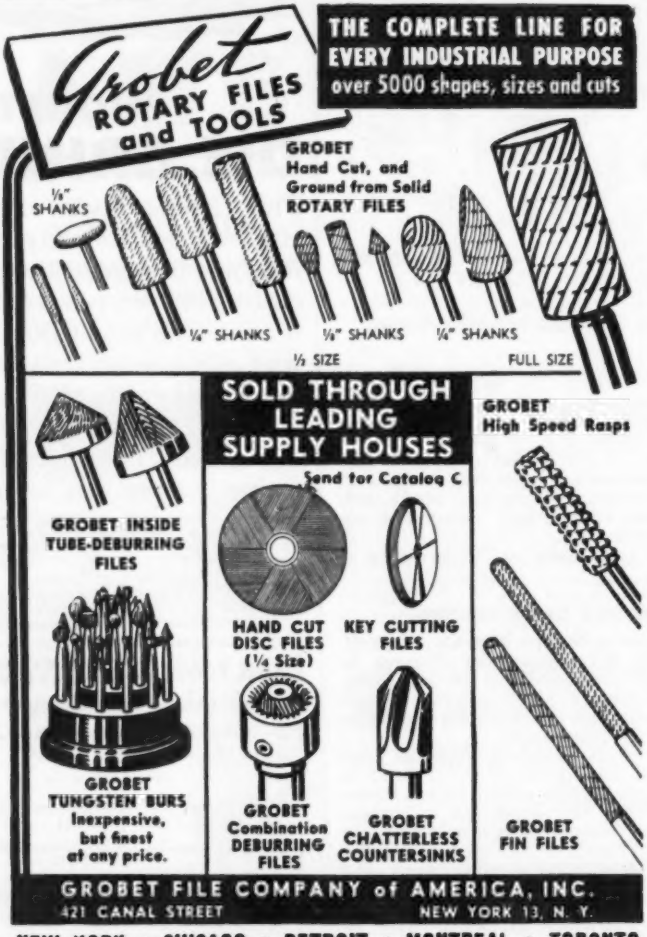
regularly furnished reads by half-thousandths and dial gages reading to ten-thousandths can be furnished to order.

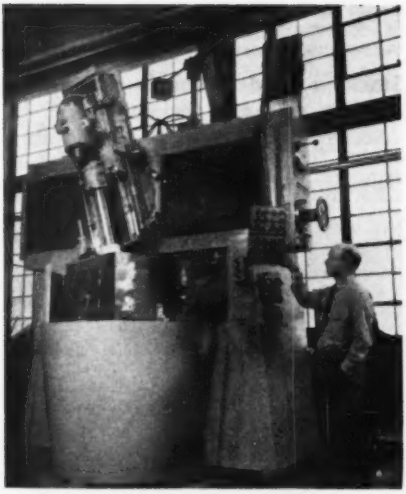
The headstock and footstock centers swing 8" diameter and take work to 36" in length. Four-inch raising blocks can be furnished which increase the capacity of the bench centers to work 16" in diameter.

Use ACTION Card, opposite page 64. Encircle No. 81

New 42" vertical grinder

Finishing of such large parts as pipeline valve plugs and their mating seats,





normally a hand job, now can be done quickly with a new 42" vertical universal grinder, according to The Springfield Machine Tool Co., Dept. BB, Southern Ave. & PRR, Springfield, Ohio.

The 3-TR grinder, which has a normal maximum swing of 52", is the latest in a Springfield series that also includes units with 16" and 25" swings. It is hydraulically operated. Operating controls are on a push-button pendant station.

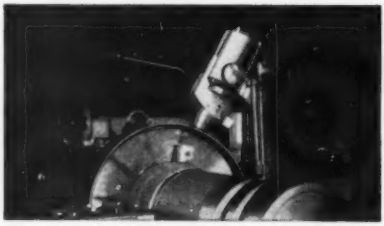
The new grinder is particularly useful on work requiring extreme accuracy and concentricity. The head can be set at any angle up to 45°, and with one angle setting, the machine can finish both male and female parts. Face grinding can also be carried out.

Use ACTION Card, opposite page 64. Encircle No. 82

Stronger threads rolled with self-opening head

Newest addition to National Acme's line of threading tools is the Fette self-opening thread rolling head. This automatic head, designed in Germany, claims stronger rolled threads because of the cold forging imparted to the metal by the rolling process. The head rolls the thread in a manner that causes the metal to flow in an axial direction with slight radial pressure so that the thread is generated ahead of the rolls. This causes metal to flow to full depth of thread and

INCREASE PRODUCTION...



Above is shown a 6M Fen Automatic Wrench operating a 28" heavy duty chuck.

• • •

For detailed information regarding the application of the Fen Automatic Wrench to your machines, phone, wire or write.

ELIMINATE "WRENCH WRESTLING"

You can put the advantages of the Fen Automatic Wrenches to your work right in your own shop on machines already in operation, or specify them on your new standard or automatic machines.

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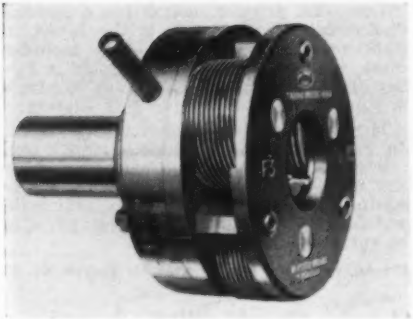
28914 Lakeland Blvd.
Wickliffe, Ohio



eliminates broken grain structure and cratering at thread crest.

Thread rolling is said to be accomplished at speeds equivalent to turning speeds of the material with high speed tools, and the burnished surface resulting from this method produces threads that are smooth, strong, and accurate.

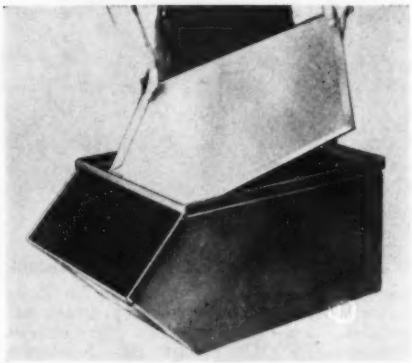
Heads are made in non-revolving type in capacities from 1/16″ to 1″, revolving type 7/16″ to 1″, and are suited to all horizontal or vertical machines. The National Acme Co., Dept. BB, 170 E. 131st St., Cleveland 8, Ohio.

Use ACTION Card, opposite page 64. Encircle No. 83

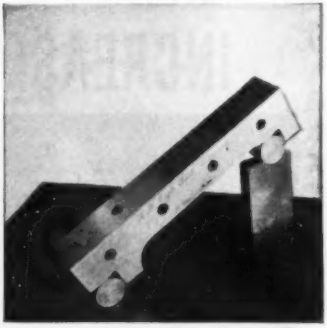
Stackbin dividers double variety of parts stored in same space

Stackbins with dividers provide up to double the number of openings for all standard sizes of Stackbins.

For installations where extra flexibi-



√Check Angles to Seconds . . . with the new **Bald Eagle** *5″ Sine Bar* only **$18.75**



Precision finished, double normalized body assures maximum accuracy and long life. Convenient tapped holes make set-ups easy. Surface and Rolls are parallel within .0002″. Rolls are same diameter within .0001″.

Immediate Shipment

BALD EAGLE SINE PLATES AND SINE BARS

Number	Center Distance	Width	Length	Shipping Weight	Price (Without case)	Price with Oak Case
1605	5″ ± .0002″	3″	6⅝″	7 lbs.	$32.50	$38.00
1610	10″ ± .0002″	5″	11⅞″	23 lbs.	$80.00	$86.00
1705	5″ ± .0002″	1″	6⅝″	3½ lbs.	$18.75	$21.75

Order through your dealer or direct. Dealer Inquiries Invited.

Bald Eagle Tool Company

Newton Building, St. Paul 1, Minn.

lity is desired, removable dividers furnish a solution . . . provide flexibility in both size and number of openings. Stackbins with permanent dividers are also available.

Stackbins with dividers can be furnished in any standard size or in special sizes on request. Stackbin Corp., Dept. B, 1085 Main St., Pawtucket, R.I.

Use ACTION Card, opposite page 64. Encircle No. 84

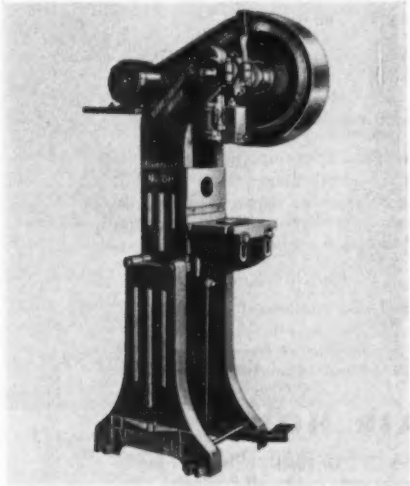
New 5-ton horning press

Greater usefulness, additional die space and extra adaptability are features claimed for this new Rousselle press. On either bench or floor models there is ample clearance beneath bed or horn for handling large, bulky work.

Bed table has 4" diameter hole for clear-through slug clearance. Bed can be mounted in six different keyed positions (in 1" steps), providing die space up to 10", or it can be quickly removed for easy accessibility to horn hole—also for drilling die set holes.

When bed is removed, special fixtures can be mounted directly to the press, since frame is accurately machined and can be drilled, tapped or bored for special jobs.

Bench models have reversible legs so that vertical frame surface can be mounted flush with edge of bench to provide obstruction-free clearance. Service Machine Co., Dept. B, 7629 South Ashland Ave., Chicago 20, Ill.



Use ACTION Card, opposite page 64. Encircle No. 85

Now... a quality

JIG BORER

that every shop can afford

The SIMA Jig Borer features an unusually large hand scraped table, providing 20" longitudinal and 15" transverse travel.

Utilizing the basic measuring system of "super accurate" end measures and .0001" dial indicators, close "tenth" tolerances can be maintained. 16 spindle speeds of 35-1500 rpm; and a "kwik-switch" spindle nose design facilitates use of standard tooling. Prompt delivery.

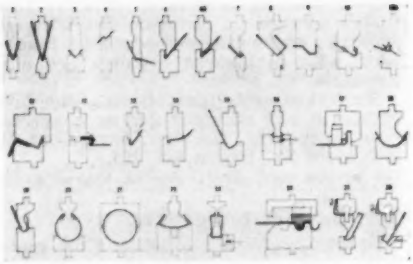
Write today for full details.

AMITOOL COMPANY
629 MAIN STREET
WESTBURY, L.I., N.Y. WEstbury 7-3400

26 standard styles of brake dies offered

As a guide for selection of the proper types of brake dies for bending and forming sheets of steel and other metals, a chart of 26 standard styles has been made available by Service Machine Co., Inc., 264 Miller St., Elizabeth, N.J., manufacturers of Semco brake dies and press brakes.

Sharp bends, scalloped designs, angular shapes, contours and folds are among these Semco standards. Two and three



Faster **...** ***Quieter*** **...** wide speed range, 3 sizes.

300 lb.—lift rate 75 ft. per min.
500 lb.—60 ft. per min.
1000 lb.—40 ft. per min.

Smaller **...** one man can easily install.

Safer **...** no spark hazard ... betters all safety requirements.

More Useful **...** for shipping docks ... refineries, chemical plants, heat treating, plating ... machine shops, foundries ... appliance, furniture, textile, automobile and aircraft assembly ... stock rooms.

See your ARO Distributor

The Aro Equipment Corporation
Bryan, Ohio
Offices in All Principal Cities
In Canada—Aro Equipment of Canada, Ltd.
Toronto, Ont.

ARO **AIR HOIST**

Also ... Air Tools ... Lubricating Equipment ... Aircraft Products ... Grease Fittings

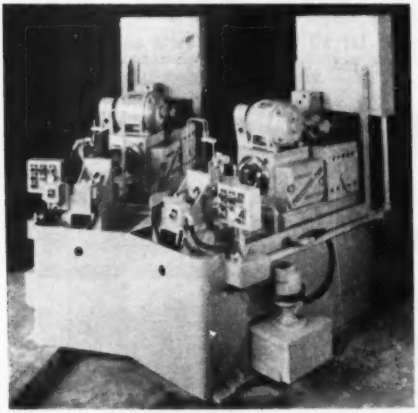
stage types of dies, as well as spring loaded and rocker types, are also included.

Use ACTION Card, opposite page 64. Encircle No. 86

Threads 400 main transmission shafts per hour with ⅞-16 U. 2A thread

A special machine for threading a main transmission shaft with a ⅞-16 U. 2A thread 11/32" long, at a rate of 400 parts per hour, is a recent development of the Murchey Div. of the Sheffield Corporation, Dept. B, Dayton 1, Ohio. It incorporates two "Precision-Pak" self-contained threading units, each having automatic cycling, precision lead screw, smooth, accurate spindle travel, and fast spindle return. The units are mounted on a specially constructed double welded base complete with built-in coolant pumps. They are positioned on an approximate 45° angle so that both can be operated at one time. An air operated collet type fixture in line with each threading unit is used to hold the part during threading.

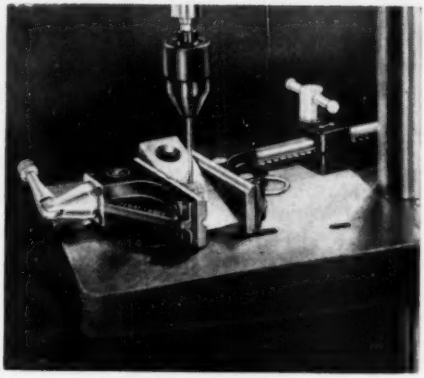
Operation sequence is simple. The operator picks up a part in each hand, inserts them in the collet and presses the starter button on each unit. As soon as the automatic threading cycle is complete, the part is automatically released for unloading. Each "Precision-Pak" has an internal threading capacity ranging from 1⅛" to 4" and an external capacity from ¾" to 3½". It will generate a maximum thread of eight pitch, spindle travel from ½"



to 4", and spindle speeds from 38 rpm to 346 in increments of approximately 15 rpm.

Use ACTION Card, opposite page 64. Encircle No. 87

Twin Time and Money Savers!



WAHLSTROM Instant-Change CHUCK saves up to 95% of tool-change time! Spindle never stops. Requires no keys, collets or wrenches. Self-centering jaws automatically grip without slip, do not chew up drill shanks. No other chuck like it!

FLOAT-LOCK SAFETY VISE instantly grips or releases work of almost any shape for SAFE drilling in any position. Prevents accidents and minimizes drill breakage. Also serves as base for low-cost jig. Comes with 9" or 12" jaw openings. Also model for band saws.

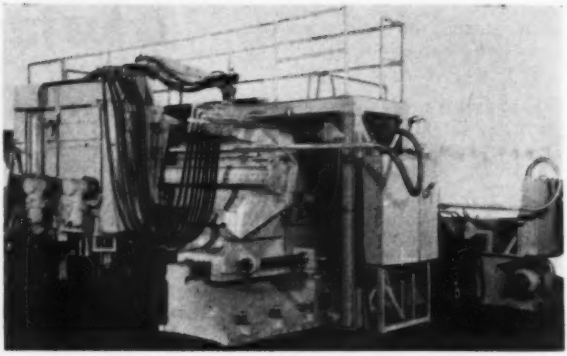
Ask your distributor for a demonstration or write us for folder W-50.

WAHLSTROM FLOAT-LOCK SALES DEPT.
AMERICAN MACHINE & FOUNDRY COMPANY
Rm. 17, 261 Madison Ave., New York 16, N.Y.

Another AMF Product

WAHLSTROM Chucks
Float-LOCK Vises

Fen Automatic wrenches are being used to move and position quills on heavy duty milling machines. These wrenches are built with a dual torque range; thereby enabling the quill to be moved vertically upward with the higher torque and with the lower torque the quill can be lowered gently to a stop. Illustrated are two Model 8M Fen automatic wrenches operating quills on a Motch and Merryweather heavy duty tank milling machine. The Fen Machine Co., Dept. B, 28915 Lakeland Blvd., Wickliffe, Ohio.



Use ACTION Card, opposite page 64. Encircle No. 88

Hause Engineering adds new drill unit to Holomatic line

The new Hause Model 24 Holomatic drill unit is rated at one horse-power and uses concentrically mounted electric motor drive assemblies for spindle power.

Advance and retract thrusts are developed by air pressure with single or multiple feed rates and rapid travel movements established by adjustable hydraulic controls. Stroke is adjustable to a full 4", for automatic, semi-automatic or manual cycling, skip drilling, back

Potter & Brumfield

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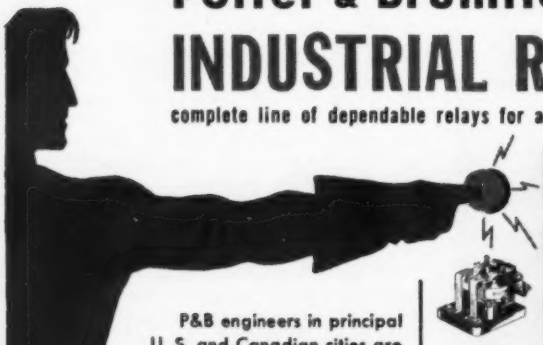
complete line of dependable relays for all types of circuits such as:



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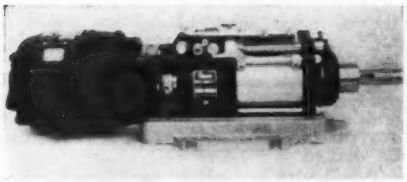


feeding, manual jogging and positive stop with dwell operations.

The built-in 4-way air control valve can be actuated by either air or electric solenoid valves.

Electric motor drive assemblies are available in ½, ¾, and 1 h.p. sizes with 1200, 1800 or 3600 r.p.m. speeds.

Operating on air supply pressure of 50 to 150 p.s.i., the developed thrust equals 8.5 times the input air line pressure.

Depth accuracies to .0005" can be maintained by use of positive stop and dwell. Mounts at any angle. Hause Engineering Co., Dept. B, Montpelier, Ohio.

Use ACTION Card, opposite page 64. Encircle No. 89

Siewek adds line of new components

Siewek Tool Company announced recently the addition of several new components to the line of drill jigs, fixture clamps and fixture details. The new items being added to the line will include fixture keys, spring plungers, spring stops, torque screws, toggle pads and swivel screws. All items are of hardened alloy steel. Siewek Tool Co., 2862 E. Grand Blvd., Detroit 2, Mich.

Use ACTION Card, opposite page 64. Encircle No. 90

TROYKE ROTARY TABLES

- **Saves fixtures and time consuming setups.**
- **Saves time in circular positioning.**

CAM LOCKING TYPE ROTARY TABLES

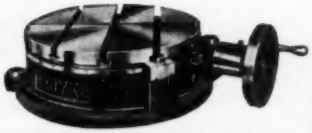
Three sizes: 12", 15", 18".

This model is intended for die sinking, bench work, and assembly of machine units when quick rotation and positioning are required.

STANDARD MODELS WORM WHEEL OPERATED ROTARY TABLES

Five sizes: 9", 12", 15", 21".

For die sinking, jig boring, cam milling. Indispensable in wood and metal pattern shops.



HEAVY DUTY MODELS WORM WHEEL OPERATED ROTARY TABLES

Three sizes: 18", 21", 25".

These larger, heavy duty models are used for jig work, planer jobs, and on horizontal boring mills.

DIVIDING ATTACHMENTS or DRILLING ATTACHMENTS can be furnished

SEE YOUR DEALER OR WRITE TO US FOR COMPLETE CATALOGS

TROYKE MFG. CO.

CINCINNATI 9, OHIO

Smaller Hayden adjustable drill

The new 1″-2″ adjustable drill, with two sets of blades that can cut from 1″ to 1½″ and from 1½″ to 2″ dia. holes, is announced by Hayden Twist Drill Co., Dept. B, 8626 Lyndon St., Detroit 38, Mich.

A scroll ring engaging the bottom sides of the blades performs the double function of adjusting the blades and supporting them against the thrust of the cut. The body of the drill is made of heat treated alloy steel; blades are made of high speed steel or carbide tipped high speed steel.

It can be used on radials and drill presses, milling machines, turret lathes, and tool room or engine lathes, in fact any place where an occasional hole must be drilled.

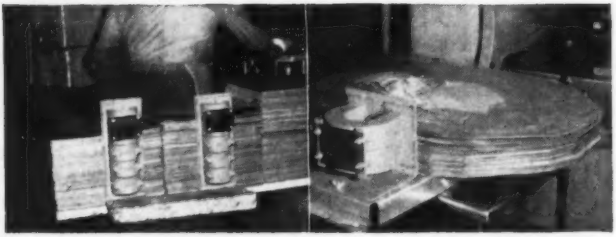
The blades are easily modified to produce round corners, flat bottoms, angular surfaces, steps, etc.

Use ACTION Card, opposite page 64. Encircle No. 99

SHEET STEEL HANDLING

can be fast and easy when you use

—Verson— SHEET FLOATERS



The Verson Sheet Floater eliminates the need for hand separation of sheets and blanks—the hard part of feeding sheet steel to presses, brakes, shears, etc. By magnetic action, the Sheet Floater forces the pieces apart—causes them to fan out for easy handling. This speeds up the feeding operations, reduces operator fatigue, and releases manpower for other jobs. Available in standard and heavy duty models for handling rectangular, round or irregular shaped pieces. Write for further information and prices.

A Verson Press for every job from 60 tons up.

—Verson—

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IT'S UNIQUE...IT'S PROVEN...

Amazing New "Floating Action"

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Tapmatic is unconditionally guaranteed to — PRODUCE MORE THREADED HOLES...TO SPECIFIED TOLERANCES...PER DOLLAR SPENT—Or full refund — without question!

At last! Human error is drastically reduced in tapping operations!

NOTE THESE TAPMATIC TAP DRIVER EXCLUSIVE FEATURES:

1. FLOATING ACTION BALL DRIVE permits tap literally to "float" into hole and thread uniformly. Operator applies no axial pressure himself: *a thread cut "weightlessly" is an accurate thread.*

2. SPRING LOADED CLUTCH is adjustable to desired torque: Prevents Tap breakage in blind hole tapping... tap automatically stops when it becomes dull.

3. COMPACT DESIGN—gives operator better visibility... readily adaptable for multiple spindle operation.

We guarantee—*using inexperienced help* — you'll get consistent thread accuracy, longer tap life, lower labor cost, fewer "rejects"— on either ferrous or non-ferrous components.

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TAPMATIC TAP DRIVERS

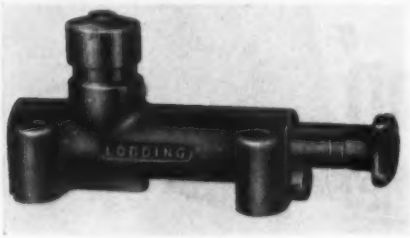
DISTRIBUTORS WANTED:
Write Eric S. Johnson, Sales Manager

TAPMATIC CORPORATION
845 West 16th St., Costa Mesa, California

Lodding develops standard heavy duty jack

An entirely new heavy duty jack has been added to the complete line of standard jig and fixture components manufactured by Lodding, Inc., Dept. N67, 79 Beacon St., Worcester 1, Mass.

This jack is horizontal in shape with a low overall height, which provides stability in handling heavy loads and



enables it to be used in confined spaces.

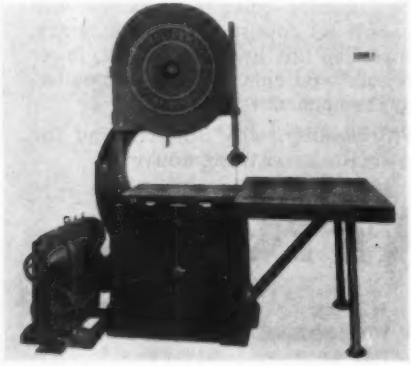
The working mechanism is protected against chips and dust by a cap. Working parts are of hardened tool steel. All parts are coated with a Parkerized jet black finish to prevent rust.

It is available in three sizes. A vertically constructed spring jack is available for lighter work and to meet special requirements.

Use ACTION Card, opposite page 64. Encircle No. 103

Heavy duty band saw has non-tilting table

This heavy duty metal cutting band saw was designed with a special non-tilting table having two frictionless rollers and two ball transfers at the right of the saw. The right hand table is 42"x42". The left hand table is 18"x36". The band saw has 38" dia. wheels with 21½" capacity under the guide. The Reeves variable speed motor unit is 5 hp, having a wheel speed range of 100 to 600 rpm. This gives a blade speed of approximately 1,000 to 6,000 fpm.



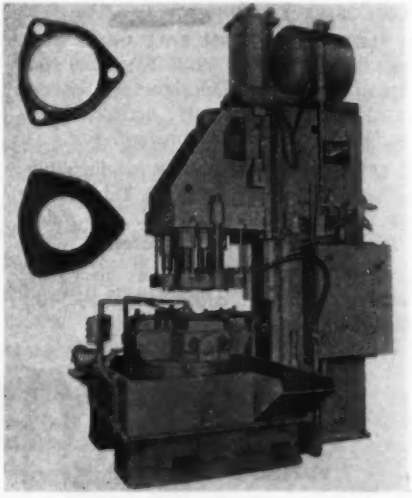
Due to the extra heavy table construction the machine is said to be ideally suited for cutting of heavy plates or castings which would be difficult to handle on a conventional band saw table. Modifications of hp and speeds are possible to suit particular requirements. Oliver Machinery Co., 1003 Clancy Ave., N.E., Grand Rapids 2, Mich.

Use ACTION Card, opposite page 64. Encircle No. 104

Air balance system

Said to eliminate counterweight assemblies on vertical machines, Buhr Machine Tool Co., Dept. B, Ann Arbor, Mich., has introduced an air balance system.

This system operates at 50 pounds line-pressure. The machine is fully equipped with a safety device to guard against air failure or creepage during idleness. It bores, drills and chamfers two automotive steel flanges at a time, at a rate of 329 pieces per hour gross. The holding fixture, mounted on an automatic index table, is arranged with hydraulic clamping.



Use ACTION Card, opposite page 64. Encircle No. 105

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You are not alone . . . a lot of plants aren't sure about broaching. Still, broaching is a modern and rapidly growing machining method which combines both roughing and finishing . . . and removes stock to PRECISION and FINISHED limits *faster* than any other machining process! Being flexible, broaching enables a plant or shop to finish both external and internal surfaces of variable shapes. You need be in the dark no longer!

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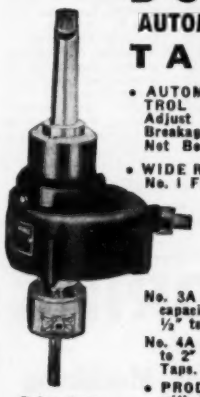

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- WIDE RANGE TAP CAPACITY No. 1 FRICTION DRIVE TAPPER —Capacity No. 2-56 to 3/8" in Steel 1/2" in Aluminum. No. 2B POSITIVE TAPPER—capacity 3/8" to 7/8" in Steel
- No. 3A POSITIVE TAPPER—capacity 1/2" to 1 1/4" in Steel. 1/2" to 3/4" Pipe Taps.
- No. 4A TAPPER—Capacity 3/4" to 2" in Steel including Pipe Taps.
- PRODUCTION THREADERS with Round Split . . . Button . . . Acorn Dies
- IMMEDIATE DELIVERY

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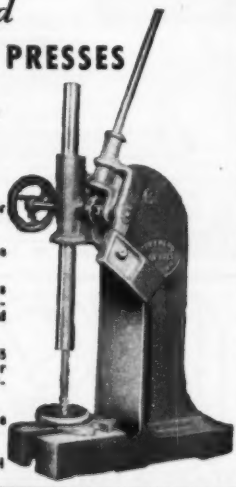

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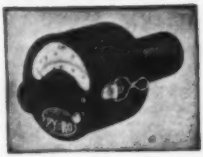

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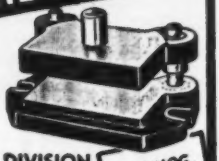
DANNEMAN *Precision* **DIE-SETS**



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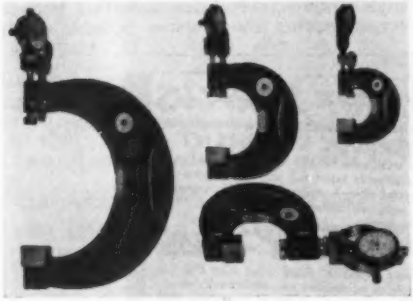
Wilmerding, Pa.

Improved Dializers

A major development in its line of Dializers is announced by Standard Gage Co. Inc., Dept. B, Poughkeepsie, N.Y. Dializers convert standard (AGD) adjustable limit snap gage frames to dial snap gages and have been available with a 1⅛" diameter indicator. Now there are available, in addition, Dializers having either a 1¾" or a 2¼" diameter indicator. Besides making it possible to select a size of dial appropriate to the operation,



there is also afforded a wider choice of graduation values in these new models—.001", .00025", .0005" and .0001".

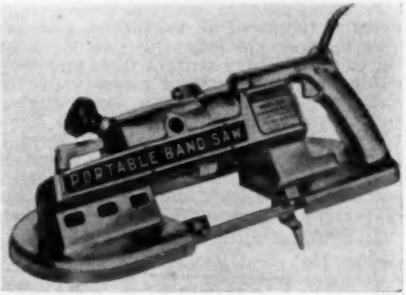
Use ACTION Card, opposite page 64. Encircle No. 108

Portable metal band saw announced by Porter-Cable

Now an electric metal-cutting band saw that is completely portable has been introduced by the Porter-Cable Machine Co., Dept. B, 25 Exchange St., Syracuse, N.Y. The new Model 524 Porta-Band saw weighs 16 lbs., is scarcely larger than a hand hack saw, and is said to be 15 times faster by actual test. It has a stock-cutting capacity up to 3¼" by 4¼".

The saw can be operated easily in any position—overhead, vertically, or within ¼" of flush with the floor. It is useful for all kinds of cut-off work in foundries, pattern and welding shops, in remodeling, wrecking, marine, aircraft, railroad, mining and steel construction work.

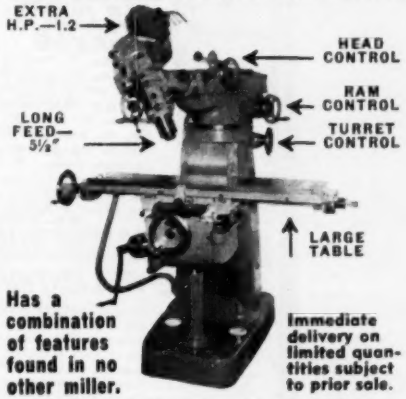
The one-half horse-power motor turns over 94 times for every revolution of the drive pulley. The band speed is 240 surface feet per minute under load which is midway between the ideal speeds for ferrous and non-ferrous materials. The design of the saw enables it to cut rectangular stock up to 3¼" by 4¼", or round stock up to 3¼" in dia. The continuous flexible blade is .020" thick, 44⅞" long and ½" wide. Blades are available in a range of 6 to 32 teeth per inch for all types of cutting. A simple blade changing device makes it possible to remove and insert blades in a moment.



The entire machine is 7½" high, 7½" wide and 19½" long; housing is rugged die-cast satin finished aluminum. All shafts passing into and out of the gear housing are protected by leather and neoprene seals so that grease is kept in and dirt out. The sawing action pulls the blade into the cut so that the rear work rest is drawn snugly against the material, eliminating any jump or chatter.

Use ACTION Card, opposite page 64. Encircle No. 109

TRISON TURRET-TYPE VERTICAL MILLING MACHINE



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Tungsten machining process revealed

A new process for machining high density tungsten to tolerances comparable to those possible with steel or brass by using ordinary cutting tools and shop equipment was revealed recently by Dr. Roberto Levi of Philips Laboratories, Inc., Dept. B, 100 E. 42nd St., New York 17, N.Y. The new process, named Porphil, has now been patented. At present it is used in making Philips dispenser cathodes for longer life electron tubes. It permits machining of these tungsten cathodes to meet specifications that require accurately controlled dimensions, porosity and gas permeability.

Dr. Levi explained that the success of the new process depends upon these three steps in handling the sintered tungsten ingots: 1. Impregnation with a suitable wetting metal, with which it does not alloy, such as gold or copper; 2. Machining; 3. Removing the impregnating metal. Desired physical characteristics of the sintered tungsten ingot are obtained by high temperature sintering with a proper consideration for tungsten powder char-

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acteristics, pressure used in forming the ingots and the dew point of the sintering atmosphere.

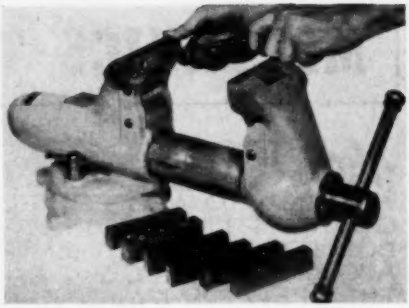
The impregnating metal acts as a filler and lubricant and prevents tearing out of particles, burnishing and excessive tool wear which ordinarily occurs. Sintering the tungsten ingot normally produces distortion and warping, but this is no longer a problem as this operation precedes machining. The process temperatures used to add and remove the wetting metal and the application temperatures are well below sintering temperature and therefore have no effect on the final shape, tolerances, or physical characteristics.

Tungsten parts having density values up to almost 90% of theoretical value may now be fabricated. Machining is relatively easy in the case of densities up to 83%.

Use ACTION Card, opposite page 64. Encircle No. 96

Complete variety of replaceable vise jaws

A complete variety of replaceable vise jaws, available on all Wilton vises, has been announced by Wilton Tool Mfg. Co., 925 Wrightwood Ave., Dept. B, Chicago 14, Ill.



Included as standard on all Wilton machinists' vises, jewelers vises, and combination bench and pipe vises are hardened speed-treat steel jaws with diamond serrations. These may be replaced with smooth jaws of hard or soft steel. Smooth jaws of brass or copper, which are non-magnetic and non-sparking, are also available, as are plastic fibre jaws designed for very delicate work surfaces. Also jaws are now designed so as to be reversible, virtually doubling life of the jaws

Use ACTION Card, opposite page 64. Encircle No. 97

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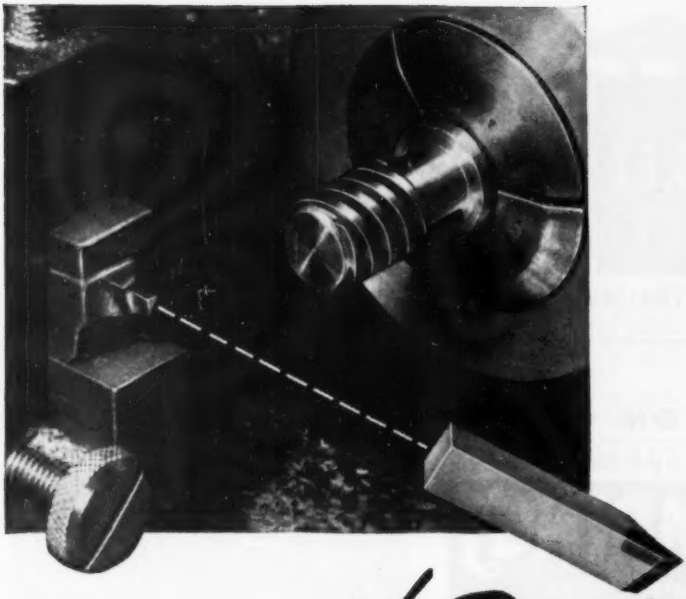

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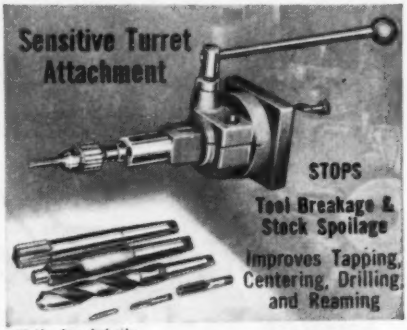

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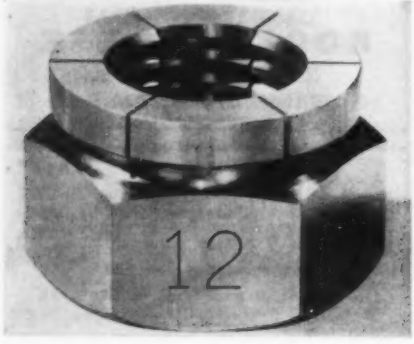
SPS makes 1200-degree nut for hot-spot applications

Standard Pressed Steel Co., Box 606, Jenkintown, Pa., has developed a new line of Flexloc self-locking nuts which are said to resist temperatures up to 1200 degrees Fahrenheit.

Capable of withstanding the heat in the tail cone of a gas turbine, the 1200-degree locknuts (SPS series 99F12) are also designed for such hot-spot applications as exhaust manifold systems, furnaces and firewall assemblies.

The new Flexlocs—machined from AMS-5642 stainless steel—are heat and corrosion resistant and retain full locking strength at elevated temperatures. They are silver plated to eliminate galling and seizure of threads. Under test they conform to military specification MIL-N-7873.



The 1200-degree Flexlocs are being made in seven standard sizes with diameters ranging from No. 10 through 9/16 inch. Threads are National Fine series.

Use ACTION Card, opposite page 64. Encircle No. 106

Hang-up flexible shaft machine

A new hang-up type flexible shaft machine is being made by the Stow Mfg. Co., 30 Shear St., Binghamton, N. Y. This model B38 can be furnished with either a ¼ or 1/3 hp motor with speeds of either 1725 rpm or 3450 rpm. Either 5 or 6 foot flexible shafts may be obtained.

This machine can be used for grinding, buffing, sanding, wire brushing, polishing and drilling (in steel or wood).

In combination, these machines can also be used for multiple drilling operations.

Use ACTION Card, opposite page 64. Encircle No. 107

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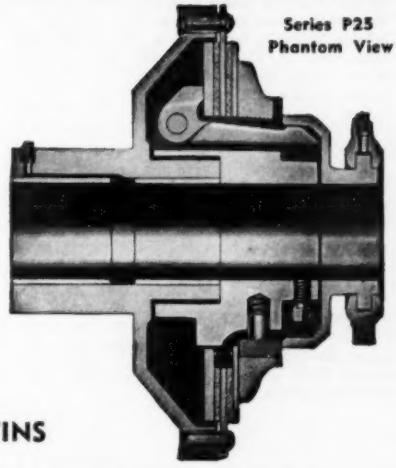

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